American Druggist

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CRUDE DRUGS AT THE LONDON DRUG SHOW ROOMS.

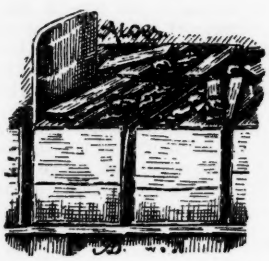
LONDON furnishes better facilities for the study of materia medica from original sources than any other place on earth. A walk through the show rooms or auction rooms is at all times interesting, as many of our readers will know from personal experience. Our contemporary, the *Chemist and Druggist*, has recently published an interesting account of what is to be seen there, from which we take certain portions relating to the more important drugs:

GAMBOGE.

Gamboge is usually imported in odd cases, with an inner covering of coarse calico, usually about a picul (133⅓ pounds), sometimes only half a picul, and not infrequently about 200 pounds in weight. The drug appears most frequently in rolls of various length, sometimes solid, more often hollow in the centre, that shape being produced by the method of collection of the gum, which is caught from the trees in bamboo sticks, the latter being peeled off when the juice inside has hardened. The pieces often bear the impress of the bamboo. Occasionally we receive the gum in more or less shapeless blocks and lumps, which clearly reveal that they have been packed in palm leaves. The dog-Latin name "gummi guttæ," by which the drug is known on the Continent, is now generally admitted to be derived from "gatah," gum, and "juma," medicinal, both words being used by the Malays of the Dutch colonies and the Malacca peninsula, the Dutch having first introduced the article into Europe. Gamboge is exceedingly liable to adulteration at the place of shipment, and it is also met with in a damp state.

ALOES.

In proportion to the superficial area occupied by it, Curaçao aloes is about the least valuable drug shown at the warehouse. The average supply on sale during the last few years must have been quite 250 or 300 cases per auction.



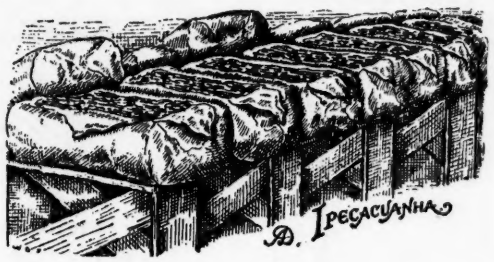
The weight of a box of Curaçao aloes is from 80 to 100 pounds, and the drug forms one hard mass with the wood, having been poured into its receptacle fresh from the boiling caldron.

Barbadoes aloes is scarcely ever met with now, but the better varieties of Curaçaos are usually brought into commerce under that name by the wholesale houses, though twenty years ago the production of aloes in the island of Barbadoes was still about 50 tons per annum. Curaçao aloes sometimes possesses the property of changing color gradually, thereby becoming much more valuable; but of late very little care has been taken to boil the juice in a proper manner, and it is now quite a common occurrence to see this article knocked down at the drug auctions by fifty boxes or more at a time, for scarcely enough money to pay the freight from the island to New York and thence to England. The Cape variety of aloes is not known at the Crutched Friars warehouse, but at the brokers' sample rooms along with most other drugs comprised in the catalogues. About 100 or 120 years ago, when aloes was first manufactured at the Cape by the Dutch Boers, its price in the London market was from 200*s.* to 250*s.* per cwt.; now it is scarcely worth a tenth of that money. The manner in which Zanzibar and Socotrine aloes is packed has been frequently described, and every one has heard of the "monkey skins" in which the juice is sent from the island where it is produced and from the adjacent parts of the mainland. Not infrequently the aloes is repacked in Zanzibar or in Bombay, and it is now met with in all manner of packages, petroleum tins being the most usual receptacle for Zanzibar aloes, while the Socotrine aloes is often repacked in Bombay in French brandy cases, of which the available supply in that market is apparently inexhaustible.

IPECAC.

Ipecacuanha is sometimes shown in very large quantities, 70 or 80 "serons" at a time, while at other periods it is exceedingly scarce.

Most of it is now imported via Antwerp, but sometimes we receive direct consignments from Montevideo, Buenos Ayres, or Rio. Formerly the drug was imported exclusively in cowhide "serons," which were sewn around it while still fresh and supple, and during the journey hardened and shrank to such an extent as to form a perfectly hard and solid wrapper. But about two years ago Mr. Weare pointed out that, when the root was packed into the "seron" in a slightly damp state, the thickness of the hide prevented the water from evaporating, and from

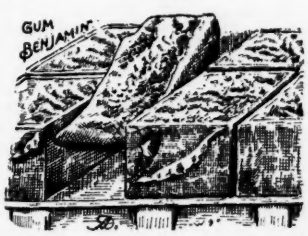


50 to 80 per cent of the packages consequently arrived in a damaged condition. Since then all the importers have adopted the present mode of packing, in which the drug is simply pressed in stout canvas bales, with an undercovering of rough calico, as shown in our illustration. The weight of a "seron" was usually about 1½ cwt., representing, it is said, the result of a fortnight's work of an average collector; but the bales are of very irregular shape, weighing sometimes only 80 pounds and sometimes attaining as much as 200 pounds in weight. The drug is valued according to the thickness of the ridges which it forms round the stem, and the brightness of the fracture. Some buyers also attach importance to the color, which varies from a pale gray to iron gray or red-brown, the red-colored packages being often preferred. It has been said that the supply of ipecacuanha ought to depend upon that of Brazilian india rubber, the latter article being now very largely produced in those parts of the province of Matto Grosso which also furnish the chief supplies of ipecacuanha.

Labor is exceedingly scarce in the interior of Brazil, and whenever the demand for india rubber is brisk the laborers find it much more pleasant and advantageous to collect rubber than to dig for "poaya," or ipecacuanha root. The East Indian ipecacuanha, which has been seen sporadically in our drug sales of late, has been imported in wooden cases of very irregular weight. To show the ipecacuanha for the auctions, the upper covering of the "seron" or bale is unsewn.

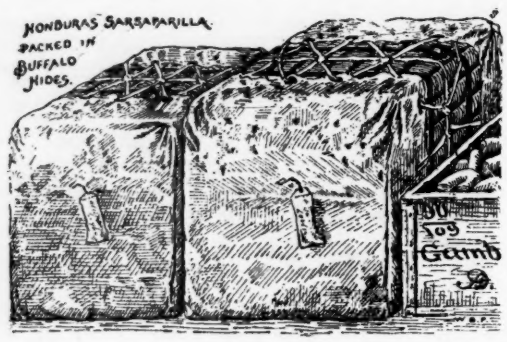
BENZOIN.

Gum benzoin is nowadays classed under four varieties. The most valuable is the Siam gum, which is generally imported in cases, into which the drug is sometimes poured in a fluid state, while occasionally it is packed only after it has dried. When shown at the warehouse, the cases are emptied and their contents placed on the floor, separated by small boards. The most valuable Siam gum is that which appears in bold, pale, loose, flat tears of a pale orange coat and milk-white fracture; but this variety is rare. The quality next in value is that which appears in an agglutinized mass of tears, or "almonds," rather dark in color; and the third grade consists of small or dark tears, either separate or agglutinized, and of a color varying from cinnamon to dark brown. A case of Siam benzoin weighs from 1 to 2 cwt. Sumatra benzoin is of a gray or dark-brownish color, more or less interspersed with tears, but occurring always in solid blocks wrapped in gunny, which is put in the case to prevent the gum from amalgamating with the wood. This gum is nearly always more or less "false packed," the sides or corners consisting of earthy matter, and hence one case out of every parcel is cut transversely, as shown in our



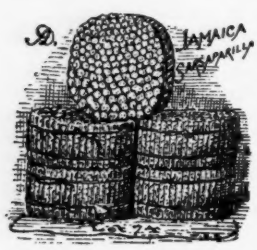
sketch, in order to detect adulteration inside. Formerly the weight of a case of Sumatra benzoin was generally from 1½ to 2 cwt., but of late small boxes, weighing sometimes only one-half cwt., have become frequent. Penang benzoin is less frequently met with. In appearance it stands nearest to Sumatra, but yet it possesses an odor and color distinctly *sui generis*. Palembang benzoin consists usually of a more or less earthy mass studded with almonds of an orange color. It is usually packed in cases of from 1½ to 2 cwt., but within the last few years it has been imported frequently in small tins of about 14 pounds, 8 of which make up a case. The Palembang gum is mostly used in the manufacture of benzoic acid, of which it contains a larger percentage, in proportion to its value, than any of the other varieties. All benzoin, except the Siam gum, is produced in the island of Sumatra. The demand for Sumatra gum has very much increased of late, and quite three times as much is imported now as was the case twenty-five years ago.

Penang gum has only been seen in the market during the last fifteen years or thereabouts, and Palembang gum is of still more recent date.



SARSAPARILLA.

Sarsaparilla is an exceedingly bulky drug, and may be seen heaped up in huge bundles in the background of the show room. The varieties now almost exclusively seen on the London market are Honduras, Mexican, Guayaquil, red or native Jamaica, gray Jamaica, and "Lima" or "Lima Jamaica." In appearance Honduras sarsaparilla is certainly the most attractive. It is packed in long bundles about 3½ to 4 feet long, and weighing generally 2 pounds each, about 80 of which go to make up a seron, as shown in our sketch. The serons are covered at the top and bottom with a piece of cowhide, and fastened together by means of thongs of the same material, strength having been previously given to the parcel by fastening it round with a few iron hoops. The distinctive "brand" of the Honduras sarsaparilla is generally branded in the hide.



There are about twenty such brands in commerce, but only about half a dozen are regularly met with in the London market.

The color of Honduras sarsaparilla varies from bright orange to dull brown; and as it is one of the "mealy" varieties, the starchiness of which is one of the principal tests of its value, small pieces are longitudinally cut out of the bundles at different places to show the character of the root. Guayaquil sarsaparilla is less valuable than Honduras; it arrives in large, rough bundles or hanks of 3 to 4 pounds, and is of a coarse and stout texture. Mexican sarsaparilla is the lowest priced variety of all. It arrives in long, dull brown pieces made up into bales, and showing large pieces of the chump which has been cut off along with the root. So-called gray Jamaica sarsaparilla, the variety almost exclusively used in this country, has no longer any connection with the island of that name, but reaches New York direct from Central America, where it is produced, and is shipped to us from the States. In regard to neatness of packing it is second only to Honduras. The bundles weigh about 2 pounds; they are barely 1½ feet long, and made up of several roots folded four or five times, and fashioned into a bundle by being wound round with the end of one of the roots. The color of this sarsaparilla varies from dull gray to iron brown, the latter kind being generally preferred; and much value is also attached to the fibrousness of the root. The so-called "native" Jamaica sarsaparilla, as a medicinal root, does not date back more than a generation. Its color varies from pale yellow to deep orange, and the small quantities thrown upon the market always find a ready sale. The weight of an original package of Honduras sarsaparilla averages about 180 pounds, of gray Jamaica also 180 pounds, and of Mexican runs from 200 to 250 pounds.

RHUBARB.

Rhubarb is imported in tin-lined cases varying in weight from 180 to 300 pounds, sometimes even less. It is usually divided by the druggists into Shensi and Canton roots, which are almost always sun-dried and high-dried or kiln-dried root. The Shensi root is the most valuable variety, while high-dried ranks lowest. Rhubarb is exceedingly liable to become wormy, and it is by no means an unusual occurrence to find that considerably less than half the number of chests placed on show consist of sound root. The quality of the drug has greatly deteriorated of late, and very little trouble is now taken by the Chinese in the curing and trimming of the root. Rhubarb upon its arrival in London is "bulked"—*i.e.*, a whole parcel emptied on a heap, and picked over by hand according to size and quality before it is again transferred to the cases, which are generally coated outside with a yellowish paper, and are not unlike tea chests in appearance.

MUSK.

A short flight of stairs affords communication between the rhubarb warehouse and the musk floor. Our sketches give a general idea of the manner in which the musk is placed on "show" every alternate Wednesday, one tin representative of every pile being emptied into a small wooden trough to enable buyers to judge of the character of the pods. The large musk pod illustrates a pod of Tonquin musk of the so called "old-fashioned" kind—*i.e.*, still having the skin adhering to it. Of recent years it has become more usual to take off the hairy outer skin from the pods before they are exported from Shanghai. Grain musk is mostly imported from India in bottles and pickle jars of various shapes and sizes. There are two or three firms, however, who put up their grain musk in bottles of a somewhat original character, elaborately labelled and sealed; one such bottle is shown in our sketch. As a general rule the quality of the grain musk imported into this country from India and China is not of the purest, though, of course, there are exceptions—so rare as to prove the rule beyond doubt.

During the greater part of this year the musk market has been greatly depressed in consequence of the introduction of coal-tar musk into commerce, but there are signs that the trade in this drug is again entering upon brighter days.

ESSENTIAL OILS.

East Indian sandalwood oil arrives here in huge copper pots, protected by a strong netting of ropework. A pot usually contains about 20 gallons of very turbid oil. The oil is therefore emptied from the pot into large copper "jacks" or vats, about 5 feet high and quite 3 feet in diameter, and left to settle. The "jack" is provided with two taps—one about 12 inches from the bottom being used to draw off the clarified oil, while the lower tap allows the thick dregs to run out. The latter are sold separately. Indian rose oil is treated in the same manner, and so, in fact, are many other essential oils stored at this warehouse. Rose oil is imported in metal drums provided with a handle and a bunghole at the top. These tins—usually old kerosene tins—are used for packing quite a large number of Eastern drugs which come into this market.

In close proximity to the oils is found East Indian nutmeg paste, in tins weighing about one-half cwt. each, four or six of which make up an original case.

Cinnamon sawdust is often used for stuffing between the bottles or other breakable packages inside cases of essential oils. Citronella and lemongrass oils were formerly imported almost exclusively in bottles of about 21 ounces each, 24 or 36 in a case. Under this mode of packing they were liable to considerable damage, and recently an innovation has been introduced by the importation of these important articles in 5-pound tins. Quite lately the oils have been shipped in so-called "tanks," heavy iron casks protected and kept from rolling about by a strong wooden crate. The tanks have evidently been sent to

Ceylon as containers for a different liquid, and are returned to us filled with oils.

IODINE.

The iodine rooms are strongly impregnated with the odor of the drug, and all the woodwork and other fixtures are thoroughly soaked with its reddish-brown evaporations. The vapor of the iodine often also affects the workmen physically. When Chilian iodine first came into our markets, about twenty-five years ago, it was stored exclusively at Fenchurch street warehouse. It was then shipped in small gunpowder kegs, weighing about three-quarter cwt. each, strongly secured by six iron hoops. The iodine, however, corroded, and spoilt both wood and iron work in an incredibly short time; and it happened on more than one occasion that the iron hoops of a keg burst and the contents were thrown all over the room. About the only material which was found not to be affected by iodine to any considerable degree was thick brown paper, and with this, therefore, the kegs were generally lined inside. At the present time iodine is imported in tierces, into each of which five little kegs are packed, three being put at the bottom of the tierce and the two others placed horizontally above them. The space between the kegs is filled up with straw. The top and bottom of every keg are protected by pieces of undressed cowhide, but these are taken off the kegs upon their arrival in London, and the pieces of hide, strongly impregnated with iodine, are always bought up at about 6*d.* per piece and shipped to Germany. Out of every parcel of iodine one or more kegs are opened and weighed to ascertain the tare of the lot.

Note on American Lithia Waters.

Prof. E. Waller, of the School of Mines, Columbia College, has published a paper on the "Determination of Lithia in Mineral Waters" (in *Journ. Am. Chem. Soc.*, June, 1890, vol. xii., 214), in which, after discussing the methods at present in vogue for determining lithia, and presenting his own observations and modifications, he takes occasion to put on record some facts regarding certain American lithia waters which are rather surprising, inasmuch as they are not in accord with what has been reported heretofore regarding these waters. We quote the author's own words:

In order to test these methods upon water containing lithia, samples of several of the best known and widely advertised waters were purchased and submitted to examination.

The results were somewhat surprising, and showed unquestionably that either the original analyses, on the strength of which those waters are now sold, were erroneous on account of imperfection in the methods used, or, what is more probable, that the proportions of lithium in those waters are liable to great fluctuations.

The results given were chiefly obtained by Carnot's fluoride method, but were in several cases confirmed by the use of other methods. The most scrupulous care was exercised to be sure of obtaining all of the lithium in the waters under examination, the spectroscopic indications having been used at every stage of the process.

In the Farmville Lithia Water, purchased at the office of the company, no lithium could be detected by the spectroscope on moderate amounts of the water. On evaporating 8 liters of the water, and treating in the manner described for the concentration of the lithia into a solution of small bulk, a lithia line was obtained in the spectroscope, but the amount was found to be too small to permit of a quantitative estimation. The experiment was repeated with 10 liters of the water, with essentially the same result.

With the Buffalo Lithia Water the reaction for lithium was more distinct when considerable quantities of the water were concentrated. From 20 liters of the water was obtained lithium sulphate corresponding to 0.0185 part of $LiHCO_3$ per 100,000.

In the Londonderry water the lithia reaction could be obtained without great difficulty. Analysis of the water purchased by myself showed a little over 4 parts per 100,000.

The company puts up some of the water in half-gallon bottles not charged with CO_2, and also some in pint bottles (called in their circulars "sulphocarbonated") which is charged with CO_2, and has also received the addition of some salts. The amount of salts added appears to be somewhat irregular.

For instance, the following results were obtained (results given in parts per 100,000):

	Total Solids.	Loss on Ign.
Londonderry half-gallon bottle average.	37.35	2.25.
" pint bottle A	149.4	4 9.
" " " B	104.2	4.5.
Average of eleven others	224.7	6.4.

The variations in the eleven bottles were 221.3 to 234.4 for total solids.

The proportion of lithium was essentially the same as for the still water.

I was told that several lots of water purporting to come from these springs had at times appeared on the market in which no lithia could be detected.

As I learned that Dr. Endemann had obtained some water of that kind, I requested him to send me a bottle. He complied, and although the bottle bore all the labels and marks similar to those purchased by myself, no lithia could be detected in it. The water contained 5.2 parts total solids per 100,000. I have heard of others who had similar experiences.

I naturally desired to obtain samples of these waters direct from the springs, taken by some one whom I knew to be disinterested. Attempts thus far have been unsuccessful.

In the case of the Londonderry Springs, all access is denied to visitors, and applications for water are referred to the bottling establishment in Nashua.

Of all the waters examined purporting to be natural, the Saratoga Hathorn proved to be the strongest in lithia. The result of tests on this water are not at present in such form that they can be here recorded, but it suffices to say that the water contains fully as much as the analyses call for (12 to 14 parts $LiHCO_3$ per 100,000, corresponding to 7 or 8 grains per U. S. gallon).

Tests were also made on the waters manufactured and sold by Carl H. Schultz as containing lithia. They were found to contain a little more lithia than claimed—*e. g.*, the formula on his "Vichy with lithia" calls for an amount corresponding to about 57 parts $LiHCO_3$ per 100,000; the analysis showed 60 to 62 parts.

The results enumerated may be thus tabulated:

Designation of Water, etc.	Total solids per 100,000.	Loss on Ign.	Non-Volatile.	Used for Determination.	$LiHCO_3$. Per 100,000.	Grains U. S. Gal.	Grains Imp. Gal.
Farmville Lithia half-gallon bottles.	16.4	1.1	15.3	8 lit.	Traces.		
do. do.	...	....	....	10 "	Traces.		
Buffalo Lithia half-gallon bottles ...	93.2	6.5	88.7	20 "	0.0185	.0011	.0013
Londonderry Lithia half-gallon bottles.	37.35	2.25	35.1	10 "	4.171	2.432	2.920
do. do.	....	....	...	10 "	4.075	2.376	2.852
do. do.	...	...	....	2 "	4.130	2.408	2.891
Londonderry half pints (with CO_2) .	...	...	...	2 "	4.129	2.407	2.890
do. do.	....		....	4 "	4.074	2.376	2.851
Londonderry Lithia half-gallon (Dr. E.)	5.1	1	4.1	1 "	None.		

Quantitative Separation of Arsenic and Antimony.

In his "Handbuch der Analytischen Chemie" (sixth edition, 2, 423), Rose mentions a method of separating arsenic and antimony by precipitating both with sulphuretted hydrogen, and then gently warming with concentrated hydrochloric acid. The antimony trisulphide is alone dissolved. Some of the arsenic trisulphide is, however, apt to be dissolved as well.

According to O. Koehler (in *Arch. d. Pharm.*, 227, 406) good quantitative results can be obtained by careful attention to concentration and consequent prevention of the precipitation of the antimony. Small quantities of arsenic were taken in presence of large quantities of antimony. The antimony trichloride solution used had a spec. grav. of 1.33, the concentrated hydrochloric acid was of spec. grav. 1.124, and the solution of arsenious acid contained 1 Gm. of arsenious acid per liter.

It was found that to 1 part of the antimony solution at least 2 parts of the concentrated hydrochloric acid were necessary to prevent precipitation of the antimony by sulphuretted hydrogen from a hot solution.

For the separation, 20 C.c. of the antimony trichloride solution were mixed with 45 C.c. of concentrated hydrochloric acid and 5 C.c. of the arsenious acid solution; into the hot solution sulphuretted hydrogen was passed.

The arsenic trisulphide was then filtered through a filter moistened with hydrochloric acid, and was subsequently washed with dilute hydrochloric acid (1 : 3). Finally, in order not to have to remove the hydrochloric acid with water, the precipitate was oxidized in a beaker with bromine water, the residue was filtered off and washed with ammonia, and to the filtrate ammonia was added. The arsenic was then precipitated with magnesia mixture and allowed to stand for some time (see Fresenius, "Quant. Anal.," sixth edition).—*J. Soc. Chem. Ind.*

Benzosol is the name of a benzoic acid ester, prepared from guaiacol, and introduced into materia medica as a substitute for this latter substance in the treatment of phthisis, its claims to superiority resting upon a less disagreeable taste. It occurs in the form of colorless crystals melting at 50° C., nearly insoluble in water, easily soluble in hot alcohol, chloroform, and ether; when pure it is nearly tasteless and odorless.—*Chem. and Drugg.*

Colorimetric Method for Estimating the Morphine Strength of Laudanum and Other Preparations of Opium.

BY S. J. HINSDALE, FAYETTEVILLE, N. C.*

PREPARE an officinal tincture of opium with assayed opium. You will know the morphine strength of this tincture.

Make three dilutions of it with dilute alcohol, as follows:

1) 3 parts tincture and 1 part dilute alcohol.
2) 2 " " " 2 " " "
3) 1 " " " 3 " " "

Put 12 C.c. of the tincture and of the dilutions in vials, and add to each 12 C.c. dilute alcohol; cork well and keep them as standard dilutions of known strength. Label them Nos. 1, 2, 3, and 4. Let the dilute officinal tincture be No. 1. Dissolve 0.04 Gm. potassic ferricyanide in 500 C.c. water, and add to it 15 drops Liquor ferri chloridi. Call this *ferricyanide mixture.* (*This must be freshly prepared,* as it will be partly decomposed in a few hours.) Prepare it in a glass-stoppered bottle with water entirely free of iron.

Place four 50-C.c. clean glass tumblers or wine glasses on a white surface, and deliver *with a pipette* (about one-third filled) 1 drop of the dilution in the glasses, commencing with No. 4 (the weakest), blowing out the pipette after each dropping. (The pipette should be about 4 inches long, and made of one-quarter inch tubing, and should deliver drops of the dilutions weighing *about* 0.016 Gm., or one-fourth grain. To test the pipette, see how many drops will balance a 0.200 Gm. weight. The reason for using so small a drop, and for diluting the tincture, is because a full drop of the undiluted tincture would develop too deep a blue color.)

Now add to each glass about 5 C.c. ferricyanide mixture (it is convenient to use a homœopathic vial as a measure), and in about one minute add 15 or 20 C.c. water, and observe the shades of color. This observation must be made *within five minutes,* as the air and light will soon cause all to be uniformly blue.

By comparison with the shades of color produced by these standard dilutions you can easily estimate the strength of any sample of laudanum with much accuracy. The sample must, of course, be diluted with an *equal part of dilute alcohol.* The presence of tannin interferes with this method, but opium does not contain tannin. Tannin is easily detected with a solution of a salt of iron. The ferricyanide mixture *must be freshly prepared* and the glasses must be *clean and clear,* as the slightest bluish tinge interferes. Wash them with caustic soda and then with hydrochloric acid, and rinse, if they are soiled with Turnbull's blue.

The ferricyanide mixture is probably the best confirmatory test for morphine. If 1 drop of water containing 0.000001 Gm. of morphine is mixed on a white slab with 1 drop of the ferricyanide mixture, a blue color will be developed within *one* minute. With water alone the mixture will become of a bluish shade in about *ten* minutes, owing to the action of air and light.

P. S.—To estimate the strength of vinous or aqueous compounds of opium, they must be brought to about the same specific gravity as the "standard dilutions" with alcohol, that the drops may be uniform in size.

A Bogus Physician in a Vienna Hospital.—A discovery took place the other day at the second largest hospital in Vienna which is mildly stated to have created "a disagreeable impression" in medical circles. It was found that an individual who had been engaged in the hospital for over a year as a medical practitioner, and during that period had attained the second rank of the hospital staff, with a fair prospect of becoming senior physician in due time, possessed no genuine medical qualifications whatever, and had gained admission on the strength of a *bogus testimonial* from the University of Innsbruck, in the Tyrol. The most astonishing part of the story is that it has now transpired that the bogus physician was grossly ignorant of the science of medicine and unable to write a prescription correctly.—*Chem. and Drugg.*

Atropine as an Antidote to Cyanide of Potassium.—A clerk in a business at Halle (Germany), who had made a pleasure trip to Leipzig with the money of his employers, on his return resolved to commit suicide to avoid exposure. He succeeded in procuring a quantity of cyanide of potassium solution, and also of atropine solution, which he swallowed in rapid succession. Beyond a few passing fainting fits, however, he was none the worse for his suicidal attempt, and after a few days' hospital treatment the would-be suicide had completely recovered his health, no antidote whatever being administered to him. It is thought that the atropine solution acted as an antidote to the cyanide.—*Chem. and Drugg.*

* The author offers this as an improvement of the method proposed by him some years ago for the same purpose. See AM. DRUGG., 1888, 121.

The Purification of Artificial Salicylic Acid.

WITHIN the last few years the employment of salicylic acid, both as an antiseptic and for pharmaceutical purposes, has become very general, and the quantity of this substance manufactured for various purposes is now very considerable.

There is a pretty large difference between the price of the "natural" acid, obtained from oil of wintergreen or from salicin, and that of the "artificial" acid, synthetically prepared from phenol, and the natural result is that the artificial is used instead of the natural acid for many purposes. It has been observed, however, that the administration of the former (usually as a sodium salt) as a medicine is often followed by disturbances more or less severe, and sometimes of a grave nature, and it has recently been proved that these serious after-effects are due to the presence of impurities in the artificial acid, and are not produced by use of the natural acid.

Professor Charteris, of Glasgow University, has carried out a series of comparative experiments on rabbits, using on the one hand the natural acid and its sodium salt, and on the other hand a number of specimens of the artificial acid and its sodium salt which were obtained from various sources.

The results of these experiments may be summarized as follows:

Salicin in 30-grain doses, natural salicylic acid in 10-grain doses, and sodium salicylate (from the natural acid) in 32-grain doses, have no deleterious effect on rabbits weighing 2½ pounds.

Artificial salicylic acid in 10-grain doses, and sodium salicylate (from the artificial acid) in 18-grain doses, in ordinary use, cause the death of rabbits weighing 2½ pounds. Even the very best specimens of the artificial acid (sold as "chemically pure"), in 15-grain doses, proved fatal to one rabbit, and in two others caused marked prostration and paralysis, but not death, while with less pure specimens a fatal result followed the administration of the acid in every case.

From these experiments it is evident that serious objections may be raised to the use of ordinary artificial salicylic acid for medical purposes, but the comparatively high price of the natural acid makes the production of a pure artificial acid very desirable. I therefore, at Dr. Charteris' request, made a number of experiments with the view of testing the possibility of so purifying commercial salicylic acid that it may be used with safety instead of the natural acid, and after trying various methods I find that the purification can be effected simply and economically by the process suggested by Williams some years ago (*Pharm. J.*, 3d S., 8, 785). A hot aqueous solution of the acid is neutralized with calcium carbonate and allowed to cool, when calcium salicylate, which is sparingly soluble in cold water, separates out in hard, glistening crystals. When the best specimens of the commercial acid are used, the crystals of the calcium salt are well formed and almost colorless, or only slightly tinged with brown, while inferior qualities of the acid yield a mass of indistinct brown crystals of the calcium salt.

A further quantity of the salt, of course in a more impure state, is obtained on concentration of the mother liquor, and the greater part of the impurities is contained in the last mother liquor, which is usually rather thick and of a dark reddish-brown color.

The calcium salt is recrystallized from hot water once, or oftener if necessary, and finally decomposed by hydrochloric acid, and the salicylic acid thus set free is washed with cold water and crystallized from dilute spirit. It is now obtained in large, well-formed, prismatic crystals, which are exactly similar in appearance to the crystals of the natural acid, and the melting point, solubility, and other properties of the two substances are exactly the same.

The physiological action of the purified acid was investigated by Dr. Charteris with satisfactory results, for it was found that after administration of the acid in 15-grain doses there was "no paralysis," not even depression, after the last injection; rabbit able to run easily.

The impurities found in commercial salicylic acid are chiefly cresotic acid, which results from the use of impure phenol in the manufacture, parahydroxy-benzoic acid, and hydroxy-isophthalic acid.

The presence of the two latter substances is due to the use of caustic soda containing potash, or to undue raising or lowering of the temperature during the manufacture, as has been shown by Fischer in an interesting paper (*J. Pharm.* [5] 20, 258) in which methods for estimating the amount of the impurities in salicylic acid are also described. None of the specimens which I examined contained more than a very small quantity of impurity; this was separated from the last mother liquor by addition of hydrochloric acid, conversion of the precipitated acids into calcium salts, and fractional crystallization of the latter, and consisted principally of cresotic acid (melting point, 151°).

It was found that one grain of this impurity was sufficient to cause the death of a rabbit weighing 2 pounds.

It is troublesome to detect the presence of the impurities, in the better specimens of commercial salicylic acid, by

direct tests, for the quantity of these impurities is usually too small to exercise an appreciable influence on the melting point or the solubility of the acid, but the crystalline form of the acid is a reliable indicator of its purity. As stated above, the pure acid crystallizes from dilute spirit in large and distinct crystals, but the presence of even a very small quantity of impurity causes the acid to crystallize in a network of delicate, closely interlacing needles.

It is therefore a comparatively simple matter to manufacture a pure salicylic acid—indeed, I understand that this is now being done—and in view of the dangers attending the use of an impure acid it seems reasonable that some measures should be taken to insure the purity of the acid used for pharmaceutical purposes or in the preparation of preservatives of different kinds.—G. G. HENDERSON in *J. Soc. Chem. Ind.*

Cooling Ointments and Creams.

THE medical man frequently desires to prescribe a cooling ointment as an application to various burning skin diseases, and it has long been felt that there was room for a better preparation than the old "Cremor refrigerans." This better preparation is indicated in a paper by Unna on cooling salves and ointments. He finds, although simple lanolin ointment, even when containing more than its own weight of water, is not permanently cooling, but rather the reverse, that a mixture of one part of lanolin with two of benzoated lard and three of water far surpasses in its effect any "cold cream" or ointment yet made. A mixture with rose water instead of plain water he recommends as a substitute for ordinary cold cream, and proposes to make a cooling lead or lime ointment for various skin affections by substituting for the rose water Liq. plumb. subacet. or Aqua calcis—always in the same proportions.

The place of ordinary zinc ointment can be advantageously filled by an Ung. zinci refrigerans, which consists of lanolin 10 parts, Ung. zinci benz. 20 parts, and Aqua rosæ 30 parts.

Of course it is quite possible to combine the cooling effect with what may be distinguished as a true medicinal or specific action. Thus, a cooling ichthyol ointment, of great value in the treatment of rosacea, may be prepared from lanolin 10 parts, benzoated lard 20 parts, distilled water 24 parts, and ichthyol 6 parts.

There is also a demand for cooling preparations which more closely approximate to cream in consistence. These are required to cover large surfaces of the skin as a thin layer, without the application of mechanical power, and to leave sufficient fat behind, as the aqueous constituent evaporates, to keep the skin moist and supple. Particularly in these creams, largely used for toilet purposes, lanolin shows its great superiority over glycerin fats. A true "cold cream" is made by mixing together 10 parts of lanolin with 20 of benzoated lard and 60 parts of rose water. The "Cremor refrigerans aquæ calcis" is made by substituting 60 parts of lime water for the rose water, that of plumbi subacet. by using an equal volume (60 parts) of the liquor.

The author recommends that these preparations should be made up in small quantities at a time, as they are not so constant as lanolin unguenta of the ordinary kind. The ointments naturally keep better than the creams, but even these are better freshly prepared.—*Monthly Magazine.*

Fluoroform.

Two parts of iodoform, 2 parts of silver fluoride, and 1 part of chloroform are mixed in a flask, which is cooled to 0°, and is connected with a lead worm kept at 23°, followed by a U-tube containing silver fluoride heated at 100°. The temperature of the flask is allowed to rise gradually, and the gas which is evolved is collected over mercury.

It is purified from chloroform vapor by prolonged contact with fragments of dry caoutchouc, and from carbonic oxide by means of a solution of cuprous chloride in hydrochloric acid.

The product is a colorless gas with a pleasant odor resembling that of chloroform. It burns with difficulty, with a blue flame and abundant evolution of hydrogen fluoride. It is only slightly soluble in water, chloroform, or benzene, but alcohol dissolves about five times its own volume.

Its sp. gr. is 2.445, and it liquefies under a pressure of 40 atmospheres at 20°. If the pressure is suddenly released it solidifies.

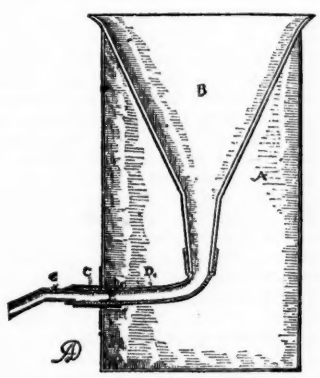
This gas is fluoroform, CHF_3. When heated with alcoholic potash at 160 it yields potassium formate and fluoride. Sodium heated in the gas burns brilliantly, with deposition of carbon and sodium fluoride and formation of methane.

When silver fluoride and iodoform react in absence of chloroform, much heat is developed, iodine is liberated, and a fluoriodoform is produced.—M. MESLANS, in *Compt. Rend.*, 110, 717–719.

A CHEAP FUNNEL JACKET.

THE appliances in the market for keeping solutions hot while being filtered are a water jacket of tin or copper, and a funnel let through the ordinary water bath.

With the tin jacket there is no means of drying it after use, which means rapid corrosion by rust, while the copper article is too expensive. The only objection I have to the water-bath jacket is the large quantity of water to be heated when the bath is used for filtering alone.



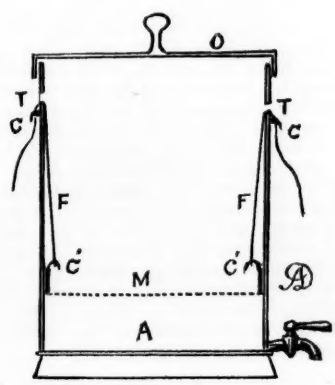
A, tin box, round or square. B, funnel. C, brass tube, with collar soldered into A. D, tubing stretched over end of funnel and fitting accurately into C. E, glass tube fitting tightly into D.

Some time ago I devised the hot funnel shown in section above, and find it to answer the purposes of a hot-water funnel jacket. The funnel being in direct contact with the water, its contents are much more rapidly heated than in the case of the ordinary jacket with its intervening tin or copper. One drawback, however, is its fixity when in use—the funnel cannot be removed without emptying the bath.

The whole thing can be put together in the back shop at the expense of a little time and patience. The one I have in use was made out of an old vaseline tin, the brass tube being the neck of a disused spirit lamp.—J. A. FORRET in *Chem. and Drugg.*

APPARATUS FOR INTERMITTENT PREPARATION OF SYRUPS BY THE COLD METHOD.

CERTAIN syrups are not used so frequently as to warrant the use of a continuous apparatus, and for such Mr. Bouvet, a pharmacist of Autun, recommends the following in the *Répertoire de Pharmacie:* A cylindrical vessel, A, of copper, tinned iron, or enamelled iron, having a diameter about equal to its height, is provided with a faucet near its bottom. Near the top it has four small holes, T, below each of which on the outside is a small hook, C. A cover, O, is also provided. A diaphragm, a trifle smaller



in its diameter than the cylinder, has a bottom, M, of fine wire cloth, and to its upper edge are attached four hooks, C′, to which are attached the strings F which are passed through the holes T and fastened about the hook C.

To make a syrup, the diaphragm is lowered to the bottom of the vessel, and into it are then placed the sugar and the proper amount of liquid called for by the formula. When the sugar has settled, the diaphragm is to be raised to the upper surface of the liquid, to remain until the sugar is completely dissolved, after which the syrup may be drawn off and filtered. By this means the sugar is always in contact with the portion of the liquid which is the least saturated, and is rapidly dissolved.

Amorphous Phosphorus.

MR. ALEXANDER PEDLER has made an exhaustive study of the action of light upon phosphorus, and, in connection therewith, of the properties of amorphous phosphorus. He has found that many statements regarding the latter, found in the text books and works of reference, require modification and correction. We give in the following an abstract of his paper (after *Journ. Chem. Soc.*, 1890, 599), so far as it is of interest to our readers.

The term amorphous phosphorus itself appears to be misleading and practically incorrect, and from the careful microscopic examination of eight samples of amorphous phosphorus, some obtained from England and some from Germany, it has been shown that in all the samples examined the great bulk of the powder consists of transparent, ruby-red, more or less crystalline particles, which have a decided action on polarized light, indicating that most probably they are not amorphous.

By careful elutriation commercial amorphous phosphorus can be divided into a very fine powder of very decided red color, and into almost black, shining particles. The latter, under the microscope, are practically all transparent, giving a ruby-red light, and seem to be crystalline in nature from their action on polarized light. In the finer powder the crystalline form is not so well marked, but many of the particles are transparent, allowing a ruby-red light to pass through, and they also act fairly strongly on polarized light.

The red powder, when heated with dilute sodic hydrate solution, yields slight but distinct amounts of phosphuretted hydrogen, and the same powder, after having been much more finely powdered and treated with the same solution of sodic hydrate, yields a larger amount of phosphuretted hydrogen. The dark, more or less crystalline particles yield no phosphuretted hydrogen. On being boiled with a solution of sodic hydrate of the same strength as used in the last experiment, but after these coarser particles had been powdered extremely fine, and the very finely divided powder treated with the same solution as before—namely, that with which the coarse powder had previously refused to give phosphuretted hydrogen—a rather large amount of phosphuretted hydrogen was evolved. At the same time the action of powdering the coarse particles was to render the almost black color a distinct red-brown. The action of sodic hydrate solution on the so called amorphous phosphorus, therefore, is evidently, to a certain extent, dependent on the state of division of the phosphorus, though ordinary commercial amorphous phosphorus is supposed to be unacted on by sodic hydrate solution, as the latter is used as a method of purifying it from ordinary phosphorus. It might be said that ordinary phosphorus may have been present in the amorphous phosphorus; but this point was carefully inquired into, and absolutely no ordinary phosphorus could be detected.

The methods used were solution by carbon bisulphide, and also heating the amorphous phosphorus in a vacuum to a moderate temperature for long periods, when ordinary phosphorus, if present, would have sublimed, as in Hermann's experiments (*Ber.*, 6, 1415).

Another property of amorphous phosphorus is said to be that at a temperature of 260° C. it is converted, or begins to be converted, into ordinary phosphorus. The following experiments were made on this point: Seven samples of commercial amorphous phosphorus, some from England and some obtained from Germany, and one sample of rhombohedral phosphorus, were heated at 305°–310° for two hours. No signs of any change could be detected in the phosphorus. The same eight samples were heated in a bath of melting lead (temperature 326°), and no change could be detected. The same eight samples were heated in the vapor of boiling mercury for a short time (temperature 357.25°), and no change could be detected. The same eight samples were heated in the vapor of boiling mercury for a short time (temperature 357.25°), and no change could be detected; but when heated in the vapor of boiling sulphur (temperature 445°), it was found that, although the samples of phosphorus did not appear to undergo any reversion, yet a certain amount of vapor passed away from the surfaces, which vapor was oxidized on coming in contact with air. The boiling point of ordinary phosphorus is said to be 290°, so that the temperature of the bath in this instance was about 155° above the boiling point of ordinary phosphorus.

. . . . . .

Amorphous phosphorus is also generally stated to be quite permanent in the air. Thus Roscoe and Schorlemmer say ("Treatise on Chemistry," 1, 470): "This substance (red phosphorus) can be exposed to the air for years without undergoing any alteration." It is, however, known that some samples of amorphous phosphorus become damp on exposure to air, and Groves (*Pharm. J. Trans.* [2], 6, 643, and "Watt's Dict. Chem. Suppl.," 954) has shown that the oxidation may sometimes go on to a considerable extent. In text books, however, the oxidation of amorphous phosphorus is referred to the presence of ordinary phosphorus, and thus Roscoe and Schorlemmer again say (p. 471): "All the commercial amorphous phosphorus, however, contains traces of the white modification, and this undergoes oxidation in the air, so that the mass always has an acid reaction, owing to the formation of phosphorous and phosphoric acids." In a very hot and very moist climate, like that of Calcutta, where all these experiments have been made, the rapid change or oxidation of commercial amorphous phosphorus is a very familiar phenomenon.

The experiment has been tried with the same sample of phosphorus four times in succession, by allowing the sample to oxidize, then removing the oxidized products by careful washing, then drying; and on standing oxidation has recommenced, as stated above, on four successive occasions.

This in itself is probably a sufficient proof that the cause of the oxidation is not to be found in the small quantity of ordinary phosphorus which might have been present in the amorphous phosphorus as at first manufactured, for the successive oxidation would require a fresh existence of ordinary phosphorus in each case.

In order to set the question at rest, samples of very carefully purified amorphous phosphorus have been taken in which no trace of ordinary phosphorus could be detected, and which had been allowed to oxidize once, and the oxidized products removed; and yet when exposed to the moist climate of Calcutta in loosely corked tubes they have become moist and decidedly acid in reaction within the short space of six days only.

. . . . . .

No sample of so-called amorphous phosphorus, prepared in the various ways as stated previously, has possessed wholly the properties of a true amorphous body, but all the methods of preparation, whether by the action of heat or light, yield a substance which is more or less transparent, and perhaps crystalline in its nature. So, also, all the numerous samples of commercial amorphous phosphorus examined appear to be distinctly of a crystalline nature.

It might be said that the definite crystalline form of phosphorus in this condition should be capable of being determined, but phosphorus generally, in respect to crystallization, appears to be an abnormal body, as was found by Hermann (*Ber.*, 6, 1415).

It would, therefore, appear that the term amorphous phosphorus, applied to the substance, is a distinct misnomer; and so far from commercial amorphous phosphorus constituting a separate allotropic modification of this element, the conclusion arrived at from the work detailed in this paper is that the so-called amorphous phosphorus is really the same as the allotropic form called rhombohedral or metallic phosphorus, the very slight differences in character noticed between the substances in question being explained by the difference in the state of division and the slight differences in property due to their mode of formation.

Whether the term amorphous phosphorus also can be truly applied to the forms of allotropic phosphorus made by the action of light, is open to grave doubt; for, even in these cases, there appear to be distinct evidences of crystalline form, though it is true that a form of phosphorus which appeared to be amorphous was obtained in some of the experiments. Practically, however, it is believed it would be better to altogether discard the use of the term "amorphous" phosphorus.

Why Thunder Storms Affect Milk.

DURING electrical disturbances it seems that cream and milk are put into a condition to sour easily. The probable cause of this is the formation of ozone, by the electric discharges.

The ozone is diffused through the air, and is believed to be the cause of the strong acid odor which prevails after the storm is passed.

No doubt if the milk is submerged in water, and access of air is prevented, no result of the kind need be apprehended; and as the more milk is exposed to the air the more it will be affected by the ozone, the milk in open shallow pans will be acidified more readily than that in deep pails, although these may be open. In our long experience, however, says the editor of the *Cultivator* (Albany), we have never had any milk affected in this way, either in shallow pans or deep pails, and are of opinion that the heat of the air preceding thunder storms is more directly the agent in the souring of the milk than the ozone that may exist in the air after the storm is passed.

Carefulness to maintain a proper temperature by closing dairy houses and cellars against the outer atmosphere will be a means of safety.

Diuretin seems to give promise of being a really useful form of administering theobromine in a soluble condition, and several papers have recently appeared which demonstrate its value as a pure diuretic, which may be given in daily doses of 1½ to 2 drachms—best in solution with the addition of a little oil of peppermint or peppermint water, which is said to be an excellent corrective.—*Chem. and Drugg.*

IVES' ETHER-OXYGEN LANTERN.

A COMMITTEE appointed by the Franklin Institute recently reported very favorably on a new lantern, devised for microscopic and polariscopic work, screen illustrations, etc., in which the hydrogen of the oxyhydrogen lantern is replaced by ether. The novelty of the invention consists in this, that a current of oxygen gas is made to pass through a small metallic cylinder containing a porous material saturated with ether. The gas, thus impregnated with ether, reaches the burner, and there produces an intensely brilliant light, not inferior to that of the oxyhydrogen lantern. The material with which the cylinder is filled is a roll of cotton through which runs a zigzag passage, which compels the current of oxygen to remain longer in contact with the cotton. Petroleum-

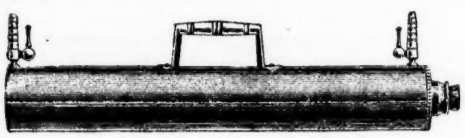


Fig. 1.

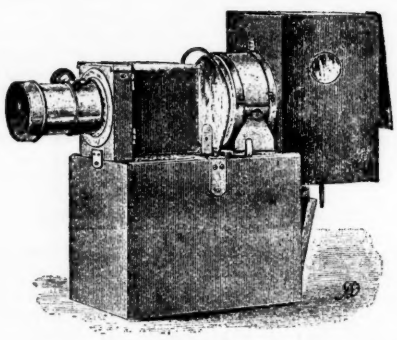


Fig. 2.

ether has been found to be preferable to the ordinary ether (so-called "sulphuric ether"), because it gives a somewhat more brilliant light and leaves no moisture or other products of combustion behind. If ordinary ether is used, the cotton in the cylinder must be taken out from time to time, to free it from alcohol and water. The flame it produces renders a smaller surface of the lime incandescent than is the case in the oxyhydrogen lantern, and for this reason a sharper image is produced.

The danger of explosion, when using Ives' apparatus, is very remote, and would at most consist in this, that the stoppers would be expelled from the cylinder or its tubulures.

Permanent Hypodermic Injections.

THE preparation of permanent hypodermic injections is a problem which has not yet been completely solved, and is not likely to be, because it is practically impossible to prevent forever the access of septic fungoid material to the injection. Still, a great deal may be done. From a recent paper on the subject by H. W. Jones (in the *Chem. and Drugg.*), we quote the following portion:

As antiseptic agents for the purpose we have had proposed glycerin, eucalyptus water, chloroform water, hydrate of chloral, thymol, carbolic acid, salicylic acid, boric acid, benzoic acid, etc. The addition of glycerin thickens the injection if added in sufficient portion to be reliable, and it renders it somewhat "messy," if not actually irritating. Eucalyptus water, boric acid, and benzoic acid are doubtful preservatives, failing entirely with some substances. Hydronaphthol in weak aqueous solution is decomposed by light, and throws down a brownish deposit. Thymol, chloral hydrate, chloroform water, carbolic acid, and salicylic acid remain as efficient preservatives. Of these, however, the writer would limit himself to three, viz.:

Salicylic water (made in the cold by saturation, and filtered).

Thymol (1 grain rubbed down with 4 ounces of water).

Chloroform water (P. B. strength); using, however, sufficient dilute hydrochloric acid (with chloroform water) to produce a faint acidity in the case of apomorphine injection.

Salicylic Water.—This cannot be used for making morphine injection, as the writer found the solution soon became charged with a crystalline deposit. On the other hand, it was found to be, after comparative trials with other substances, the best agent for eserine, and the sulphate dissolved in the salicylic water remains practically unchanged, the usual coloration scarcely appearing. Salicylate of eserine is well known as a stable salt, and for injections for the human subject it is sufficiently soluble (solubility, 1 in 140) to allow of its use; but, as eserine is very largely employed by veterinary practitioners, and as the salicylate is not sufficiently soluble to allow of a strength of 1 in 80, or even stronger, it is worth bearing in mind how well salicylated water acts with the alkaloid in question in the form of sulphate, which is a most soluble salt and the one most generally met with.

Thymol Water.—This is a good preservative for ergotine, especially if the acid phosphates of potash and lime be first removed by neutralizing with ammonia. It also answers very well for other substances.

Chloroform Water.—This is possibly the simplest and best of all preservatives, and answers equally well for all kinds of injections, and for making a permanent solution of morphine leaves nothing to be desired. The color does not change, or only changes very slightly, on keeping, and no deposit forms. At least this is according to the experience of the writer.

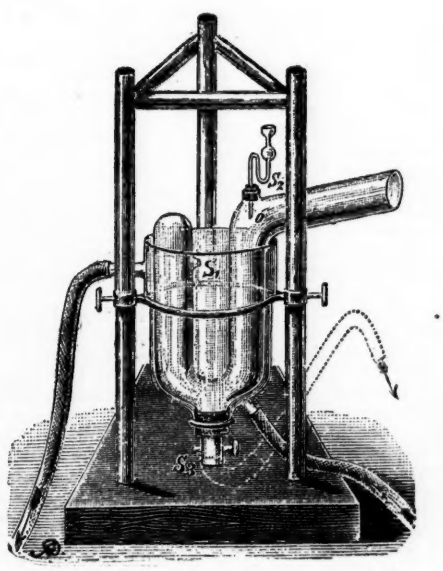
As salts of the rarer alkaloids are now as easily obtainable as the alkaloids themselves, they are best bought in the combination required. The commoner stock alkaloids of every pharmacy may be converted into injections as under:

Aconitine (English), by dilute sulphuric acid.
Codeine, by dilute phosphoric acid.
Strychnine, by dilute hypophosphorous acid.
Caffeine, by a strong solution of sodium salicylate (q.s.)

In each case using chloroform water, and adding the solvent very carefully to the alkaloid in the presence of a small portion of the water.

On the Active Principles of Insect Powder.

E. HIRSCHSOHN has found that the active principles of insect powder are not volatile. Much discrepancy exists among various authorities regarding the active constituents of the substance. Some of them regard the insecticidal principle to be volatile, whence it has been customary to direct the powder to be kept in closed vessels, and also to judge of its quality by its more or less fresh odor. Hirschsohn, however, found that insect powder, even when kept for five years in a paper bag, and having lost all odor, still retains its insecticidal powers. The author made special experiments in this direction, both with Persian and with Dalmatian powder. After heating both, during eight hours, to 120° C., they were found to have retained their activity, though they had lost their odor. This shows that the principle is not volatile. Nor was the activity of the powder diminished by neutralizing the acid constituent by ammonia. The insecticidal principle is soluble in alcohol, ether, chloroform, benzol, carbon disulphide, and petroleum-ether, but is insoluble in water. The active principle is shown not to be identical with pyrethrin by the fact that the root of pyrethrum (which also contains pyrethrin) has no action upon roaches or other insects.—After *Rundschau* (Prag.).



AN IMPROVED RECEIVER.

IN some cases it is desirable or necessary to surround the receiver with a cooling mixture, or to apply at least a stream of cold water to it in order to prevent evaporation and loss of the distillate. Carl Scharch recommends to use a receiver of the shape shown in the cut. It is U-shaped, has a safety valve at S_2, and an outlet at S_3. When more than one liquid condenses in the receiver, the heavier one may be drawn off below. If the lighter one is to be drawn off, a bent tube like that shown by the dotted lines may be fitted into the neck. The U-tube stands in an open vessel supplied with a stream of water.—*Zeitsch. f. ang. Chem.*

The Manufacture of Ammonium Chloride.

THE following is an abstract of a paper by Dubosc and Heuzey, published in the *Bull. Soc. Ind. de Rouen* (after *J. Soc. Chem. Ind.*), in which a method of manufacturing ammonium chloride is described which differs from that usually employed, but is said to be economical.

In the manufacture of gas from coal, ammoniacal liquors are produced which yield three commercial products.

1st, the crude liquor, density 4° to 5° B., containing about 4 per cent of NH_3.

2d, the concentrated liquor, density 10° to 12° B., containing 12 to 14 per cent of NH_3.

3d, crystallized ammonium sulphate containing 20 to 21 per cent of nitrogen, corresponding to 25 per cent of NH_3.

These three products may be treated with metallic chlorides so as to yield ammonium chloride, the process varying with the product treated.

1. Treatment of the crude and concentrated ammoniacal liquors.

These liquors contain, besides ammonium sulphate, free ammonia, ammonium chloride and cyanide, a considerable amount of ammonium carbonate and sulphide, which precludes the possibility of conversion into chloride by the direct action of hydrochloric acid, which would give rise to large volumes of carbon dioxide and sulphuretted hydrogen.

The authors base their new process on the precipitation of the sulphur and carbonic acid by double decomposition with a mixture of the chlorides of iron and calcium in proper proportions, neither the sulphides nor carbonates of these metals being soluble in presence of ammonium chloride.

The originality of the method consists in using the mixture of iron and calcium chlorides; it has the advantage of (1) complete desulphurization, which is not possible with the use of calcium chloride alone, owing to the slowness with which calcium sulphide is formed; and (2) rapid precipitation of the carbonates as $CaCO_3$, which does not take place in the presence of iron alone, as the colloidal carbonate of iron is then formed.

The process is carried out as follows: The gas liquors are freed from tar by being left for forty-eight hours in cisterns, and are then pumped up into a tank into the bottom of which the necessary quantity of the mixed chlorides has been already introduced. The mixture is stirred mechanically and left to settle for twelve hours. The upper two-thirds of the mother liquor are then perfectly clear and absolutely free from sulphide and carbonate. After being slightly acidified, if necessary, this portion is conveyed directly by pipes to the concentrating pans.

The precipitate, consisting of the mixed carbonates and sulphides of iron and calcium, is filtered on horizontal filters, or preferably in the filter press.

The dried residue forms an excellent purifying mixture for coal gas analogous to Laening's mixture.

The density of the liquors thus obtained is generally 7° B., and they must be evaporated down to 13° B. For this purpose the authors use flat iron pans made of strong sheet or cast iron, containing 2,000 liters. A close-grained cast iron wears best. The fire and pans are covered in entirely by a hood of silicated and stuccoed wood. All the joints are made tight, so that the vapors may be entirely carried off by a large flue into the main chimney shaft, where any sulphuretted hydrogen due to possible imperfect desulphurization is burnt by a special arrangement.

When the density reaches 13° B. the liquid is drawn off and left to crystallize in wooden troughs. It takes fifteen days to crystallize completely, the crust being broken each day. When acicular crystals of the ammonium chloride are to be produced, the operation is carried out exactly as above. If cubes be desired 5 per cent of a solution of perchloride of iron (density 35 B.) must be added to the mother liquors. This seems to act merely "by presence," and remains in the mother liquors. For certain chlorides used in galvanizing, manganese salts, or zinc salts, or fatty matters are added. When the crystallization is complete, the residual liquid is drawn off and pumped back into the evaporating pans, and the crystals are taken out, drained, and then either sent to a drying chamber whose temperature is 50° to 60°, or fritted in a reverberatory oven. Slaked lime is used to give the brownish-yellow color required in commerce, and the product is then packed in barrels.

To produce the refined salt, the solution is only concentrated to 11° B., then pumped into wooden troughs, and the metals it contains precipitated with ammonium sulphide. The liquid is then concentrated in vessels made of enamelled cast iron, and crystallized in earthenware pans. The crystals are drained and dried in the drying chamber.

As the enamel frequently splits off the cast iron pans, it must be replaced by a cement composed of dried calcium carbonate and potassium silicate, made insoluble by the action of hydrofluosilicic acid.

2. Treatment of ammonium sulphate by metallic chlorides. The treatment varies with the nature of the chloride added.

1st. When the metallic chloride used yields an insoluble sulphate (*e.g.*, Ca) on addition to the solution of ammonium sulphate:

The ammonium sulphate is dissolved in the smallest quantity of water possible. It is then pumped up into a trough placed at a certain height, into which the necessary amount of chloride has been previously introduced.

The mixture is stirred constantly, and when the reaction is complete it is sent to a special filtering apparatus, or to a filter press in which thorough washing is possible.

The filtered liquid is then concentrated in the manner previously described. The residue of calcium sulphate may be used for agricultural purposes.

2d. When the metallic chloride (NaCl, $FeCl_2$, $ZnCl_2$, $MnCl_2$) yields a soluble sulphate:

Any of the chlorides mentioned might be used, but the one actually employed is ferrous chloride. A solution of the crude salt (such as is produced in cleaning iron surfaces), of a density of 24° B. and containing 25 per cent of substance, is neutralized and pumped into caldrons, where it is heated to over 60° C., and then the necessary amount of ammonium sulphate is added. Double decomposition ensues, and as soon as the surface begins to froth the mother liquor is sent to the crystallizing vessels, where 95 per cent of the iron sulphate crystallizes out. The iron crystals are washed, and the wash water added to the ammonium chloride mother liquors. To obtain the crude ammonium chloride, these liquors are simply evaporated in flat pans. To obtain a refined salt, ammonium sulphide and barium chloride are added, and after filtration the liquors are concentrated in enamelled vessels as before.

Preparations of Digitalis.

CONTINENTAL physicians have recently been discussing the efficacy of preparations of digitalis, and one of them focussed the general ideas when he said that he preferred the cold infusion on account of its supposed greater diuretic activity. It is prepared by taking from 0.25 to 0.40 Gm. (4 to 6 grains) of powdered digitalis leaves and adding 300 Gm. (8 oz.) of cold water. This should be allowed to macerate for twelve hours, and should then be filtered. It may be sweetened with syrup. When it is desired to obtain a powerful diuretic action, it is preferable to administer this quantity in two or three doses. There is nothing very new about this, but it is well to print it as a reminder that preparations of digitalis containing alcohol are often inert.—*Chem. and Drugg.*

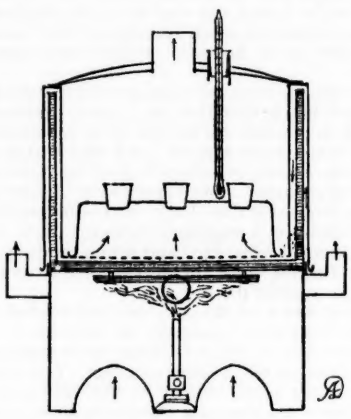
Carbolic Acid in Disinfectant Preparations.

BEFORE proceeding to describe the methods for the analysis of carbolic powders, which he himself has elaborated, Dr. Muter very rightly pointed out, at a recent meeting of the Society of Public Analysts, the want of unanimity existing amongst chemists, local authorities, and contractors in adopting terms that shall correctly indicate the nature or quality of the disinfectant powder. The form of contract commonly runs: "For carbolic acid powder containing 10 per cent of liquid carbolic acid at a fixed price per ton." What must be taken to be meant by "ten per cent carbolic acid"? Certainly not 10 per cent absolute phenol, for, as chemists well know, the liquid acid as ordinarily sold for disinfecting purposes—and this is generally used for the powder—chiefly consists of crude cresylic acid (cresol). It is, in fact, the crude coal-tar phenols, from which most, if not all, of the true carbolic acid has been removed by carefully conducted distillation, the boiling point of carbolic acid being 184° C., and of cresylic acid 203° C. Dr. Muter reasonably says, "Why should this fact not be very generally recognized by medical officer of health, contractor, and analyst alike?" There can exist no doubt of the great importance of a control analysis of such a well-established and widely used antiseptic. When, then, the report of the official analyst states that the powder contains so much per cent tar phenols or cresol, the authorities not unnaturally demand an explanation, as they distinctly contracted for "carbolic acid." The author quoted an instance—and he appears to be acquainted with many similar instances—where a firm having taken a contract to supply carbolic acid powder, the medical officer threatened to compel them to supply a powder containing 10 per cent of pure absolute phenol, as that was what he understood by the simple term "phenol." Dr. Muter submits for consideration the advisability of impressing the authorities and the manufacturers with the necessity of dropping misleading technical names, and, when contracting for a carbolic liquid or powder, to offer or regard it as containing so much per cent of uncombined tar phenols (chiefly cresol). This appears to us a wise suggestion, and decidedly the way out of the difficulty, especially as it is now generally admitted that cresylic acid, or cresol, is in no way inferior—indeed, some affirm it to be superior—to carbolic acid, or true phenol, as regards its antiseptic qualities.—*Lancet*, May 3d.

A CONSTANT AIR BATH.

An improved hot-air bath, which can be kept at a constant temperature, has been devised by Mr. H. Grimshaw. We give his own description (after *Journ. Soc. Chem. Ind.*, May 31st):

The construction of the bath will, I think, be seen at a glance from the diagram appended, which is one-eighth the real size. It consists of four parts: 1, the body; 2, the vessel forming the air envelope or casing; 3, the base—all of which are cylindrical. 4. The lid or cover. The body is made of cast iron or brass, and is merely a cylinder 11½ inches in diameter externally and 8 inches deep, closed at the bottom, and of a uniform thickness of



one-quarter inch. The object in making this so thick is to provide a mass of metal which will distribute and, to a large extent, control the heat. This part might be made of sheet copper or even stout sheet iron, but would not be so effective. Also, the body and the base might be cast in one piece, but this would add unnecessary weight.

The base is made of stout sheet iron or sheet copper, and is, in the model I have made and used, 11½ inches in diameter and 7 inches deep. It is cylindrical and closed at the top. It is provided at the bottom with semicircular apertures for the admission of air to the Bunsen lamp, and close to the top are four short chimneys of sheet iron at least 1 inch in diameter, turned upward at a right angle. The object of these is to carry away the products of combustion and deliver them at a level above that of the intake of air to the drying chamber, thus avoiding the presence of these gases in the interior of the air bath. Attached to the top of this part of the apparatus is a kind of baffle plate of one-quarter inch iron to receive the flame of the Bunsen instead of allowing it to play directly upon the top of the base cylinder, by which means radiation of heat from the bottom of the bath is lessened and the sheet metal of the base is not burned away. I need scarcely say that all the joints of this heat chamber or base should be made tight without the use of solder, which would be melted out. A rose burner is better than the ordinary Bunsen as the source of heat. In the next bath which I make I intend to make the base of a slightly greater diameter, so that in packing the air bath for transit or storage the other portions may be placed inside it to save room.

The third portion of the bath, which I will call the air case, is merely a double cylinder of sheet iron or copper, open at top and bottom, but with the space between the two cylinders closed at the top and open at the bottom, so as to slide over the body of the bath, leaving an air space of about one-quarter of an inch on each side of the body, the thick metal of which imparts its heat to the air as it travels up the outside and down the inside. The air case is of course cylindrical, the internal cylinder being 10½ inches in diameter and the outer cylinder about 1 inch wider, whilst the height of each is about 8½ inches. I propose to try the effect of adding still another enveloping cylinder externally to this part of the bath, through which the heated air from the base will circulate, which will give an economy of heat and possibly still greater regularity. A series of "notches" taken out of the bottom edge of the interior cylinder admit the hot air uniformly all round the cover of the circumference into the whole of the chamber by means of a finely perforated plate, shown by the dotted line.

The fourth part of the air bath is the cover, which is made double to prevent radiation of heat, and has a chimney 2 inches in diameter and about 2 inches or 3 inches high. The chimney may have a circular damper fixed on a swivel, or a series of perforated caps, to regulate the draught of air through the drying chamber. Through the lid there is a 1-inch aperture for a cork carrying the thermometer. Another similar aperture may be made to carry a maximum thermometer to indicate whether, between the intervals of reading, the heat of the bath has been at any time too high.

The diagram shows a stand, inside the bath, of about the right height to bring the vessel containing the substance into the most constant zone of heat. The outside of the bath may be of course japanned or colored as desired.

ANOTHER CONSTANT AIR BATH.

Constant air or water baths, with so-called thermostats, are at present occupying the attention of inventive experimenters, and appear to be as fruitful a field of invention as the constant extraction apparatus. The reason is simply this, that this kind of apparatus has become generally necessary, and is desired to work so accurately that it may be trusted to do its work without watching. The time is not far distant when every laboratory will have to be provided with thermostats, and it is well to look around in time to select the best one.

One form of this apparatus which has recently been highly recommended is here illustrated. Fig. 1 represents the thermostat of D'Arsonval, with the improvement suggested by B. Pensky, of Berlin (*Zeitsch. f. Instrum.*, 1890, 28). The air bath is a double-walled, cylindrical vessel with conical bottom, the inner chamber being continued, in form of a tube, to the end of the cone, and the opening being closed by a cap, N. Its upper edge is somewhat slanting, for the purpose of making the point *o* higher than any other part, for it is necessary to fill the apparatus with freshly boiled water completely, without any bubble of air remaining in it. The tube *r* is connected with the gas supply. Its orifice is opposite a rubber membrane, M, which is under more or less outward pressure from the water enclosed in the apparatus, the pressure being, of course, somewhat greater

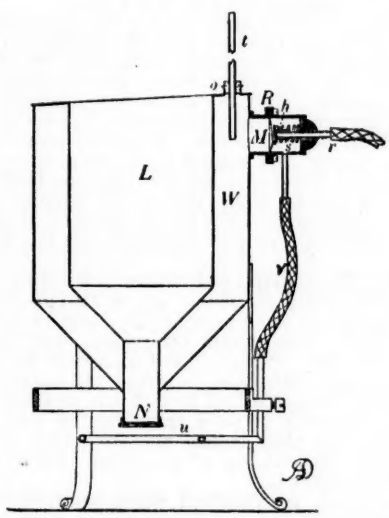


Fig. 1.

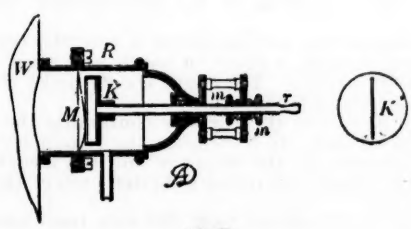


Fig. 2.

near its lower surface than near the upper, due to the difference in the height of the column of water. At *o* there is a stopper bearing a long glass tube, in which the water can rise when it becomes unduly expanded by heat. When it does rise, the pressure on the rubber membrane causes the latter to more or less occlude the orifice of the gas tube, and the consequence is a diminished gas supply through the tube *v* to the burner *u*, until the water in the tube has sunk owing to a fall of temperature. When the apparatus is first set in action it requires some time and adjustment of a slide at *s* to get the orifice of the gas tube at the proper distance from the membrane, and in the original apparatus (as here illustrated) this adjustment often took place by jerks, causing the burner to become entirely extinguished. Pensky has, however, introduced an ingenious improvement, shown in Fig. 2. The end of the gas tube is shaped as a round flat disc having a perpendicular, fine slit for the exit of the gas. When the tube has once been properly adjusted in its bearings, and there is an increase of temperature beyond that required, the lower bulging portion of the membrane M (see cut) begins to close the slit from below upward by mere contact. There is no friction of any kind. A simple reduction of temperature will again make the membrane recede. Of course, the membrane will have to be occasionally renewed. The air bath is provided with a suitable cover, which is omitted in the ii

lustration. If a current of air is to be passed through the apparatus, the cap N is more or less turned on one side.

This apparatus is made by Sommer & Runge, of Berlin, and allows the temperature to be kept constant within 0.1°C.

Otto of Rose.*

THE most important centre of the production of otto of rose is in the region of the Balkan Mountains, and includes about one hundred and fifty villages situated in the two valleys of Toundja and Strema, affluents of the river Maritza. These two valleys run from west to east, and lie between the great Balkan chain on the north and the Sredna-Gora Mountains on the south, the extreme point where rose culture is carried on being Koprivchitza on the west and Tvarditza on the east. The best otto is obtained on the southern slope of the Balkans. Here the climate is temperate, but the variations in temperature are sudden and frequent. The ground is sandy and porous, as a rule; where this is not the case and water accumulates, roses are killed by the frost, or by fungi which attack the roots. Although the rose cultivation extends over a large tract of country, it is nowhere conducted on a large scale by any one individual, but is divided into a large number of small plots belonging to small proprietors. The dealers live in the towns, and, although they sometimes buy the flowers and distil the oil, they rarely cultivate the roses, and then only to a small extent.

The roses are grown in long borders or plots, 100 or 200 meters long, the plants attaining the height of a man. Between the plots a space of 1½ to 2 meters is left, so as to allow of a cart passing along between them.

Two roses are usually cultivated, a red and a white one, specimens of which, received from M. Christoff and gathered in the Kezanlik plantations, have been identified by Dr. Blondel. The red one proves to be a branching form of *Rosa damascena*, and the white one *Rosa alba*. One other rose, known as the Constantinople rose, is sometimes met with near Kezanlik. It grows more quickly, but is less hardy, and cannot be made a special cultivation. It has larger and more coriaceous leaflets, and the flower is smaller than that of *R. damascena*, and of a dark, nearly violet color, like *R. Gallica;* it probably belongs to the same group as the latter, but has not been identified.

The *Rosa alba* is employed to form a dividing line between the different plantations, and is also grown at the end of each plot, so as to present only roses of less value to the peasant, who would otherwise steal the more valuable red rose. It is not used, as a rule, for distillation. Dishonest cultivators, however, take advantage of the fact that when distilled it yields a product rich in stearopten (although of poor fragrance) to mix it with the red rose, and thus obtain an otto which will bear dilution with Turkish oil of geranium (oil of *Andropogon Schœnanthus* L.).

The plantations are renewed, when required, in October or November, by making trenches about one-half foot deep and 1 wide, and laying side by side in them suckers with a portion of the underground stem attached.

About four or five are placed in a row, the leaves all being covered with a layer of earth and then with a thin layer of manure. The young shoots make their appearance in five or six months.

In April and June the furrows containing the young plants are weeded. In November the remainder of the earth is returned to the trenches, and the trenches are ultimately formed into ridges to better protect the roots of the plants.

In May of the second year the rose trees are about 2 feet high and yield sufficient flowers to pay the expense of their cultivation up to that date. The next year they are in full bearing; and the maximum product is obtained when they are five years old, although the plants will live more than twenty years. At ten years of age they are, however, usually cut level with the ground, new branches, and even flowers, appearing the next year. The flowers commence to expand between May 20th and 28th, and they are collected daily till June 15th and 20th. The collection commences every day at dawn, for an opening flower bud left till next day will then have lost its fragrance and its color. The flowers are collected by women, and, although the small proprietors usually collect their own, the larger growers pay about 2 centimes per kilo for collecting the flowers. The blossoms are placed in a basket carried on the left arm or in the apron. The fingers become gradually hardened to the spines, so that the pricking ceases to be felt; but the fingers become covered with a blackish, resinous substance which has a terebinthinous odor, and which at the end of the day is scraped off, rolled into little balls, and kept for smoking in cigarettes, inserted in the tobacco, to which it is said to give a delicious odor. The contents of the basket are weighed in the field, paid for, and emptied into sacks, which are carried at once to the distillery. If the white roses are present in too large proportion, they are paid for separately at a lower price.

The stills are usually placed in sheds near the river, for the convenience of obtaining a good supply of water, and in some cases are let by the proprietors at the rate of 4 francs per still. The stills are of copper, and are made to contain 75 liters of water and 10 kilos of flowers.

The latter are introduced by means of an osier basket, and the stills are heated with long logs of wood lighted at one end, placed under the still. After a time, if steam comes out of the refrigerating tube, the fire is moderated, and when 10 kilos (two flasks) of rose water have distilled over, the fire is removed by withdrawing the burning logs. The still, when cool, is opened, the contents strained through the osier basket, and the water remaining in the stills saved for the next distillation. If the operation is continued until 15 kilos of rose water are obtained, the otto is of inferior quality and contains more stearopten.

The rose water is then submitted to distillation a second time, 40 liters being distilled at a time, and only 5 liters collected. The vessels in which it is received have the shape of a long-necked flask, and the water is at first milky, like an emulsion, the oil floating after a time in the neck of the flask. It is removed by inserting a conical tin funnel about 2 Cm. long, furnished with a slender handle, and having a capillary orifice. It is dipped below the surface of the otto, and when a drop of oil, on raising the funnel, appears at the orifice, it is emptied quickly into a special flask.

About 3,000 kilos of flowers are calculated to yield a kilo of otto, and this quantity of flowers is the usual yield per hectare, so that it may be considered that a hectare of roses yields a kilo of otto. The adulteration of the otto takes place chiefly by the addition of oil of rose geranium (*Andropogon Schœnanthus*), whereby the congealing point is lowered from 15° or 16° C. to 14°, 13°, or 12°, and even lower. The purchaser of otto generally brings with him a basin and thermometer, and, having obtained the desired temperature with the thermometer, inserts a flask containing 15 Gm. of the essence to be tested. In about three minutes crystalline needles appear, and in ten minutes the otto is solid enough for the uncorked flask to be reversed without spilling a drop. The price varies according to the degree of congealing point, that below 12° C. being openly sold at a special rate. The average production of otto of rose in Bulgaria is about 3,000 kilos in good years, and 1,500 kilos in bad ones.

The peasants are paid, according to the season, at the rate of 0.22 to 0.23 franc per gramme for otto of standard purity. The flattened circular metal bottles in which it is exported contain 400 Gm., 1 kilo, or 2½ kilos, and the price of the pure essence is 800 to 900 francs per kilo, according to the season. The bottles are generally enveloped in felt. When the essence is freshly distilled it has a slight empyreumatic odor, possibly due to the fact that the water in the stills at the end of the day, having served for several distillations, has dissolved vegetable salts and boils at a temperature distinctly above the boiling point of pure distilled water. Otto of rose is also said to be produced in notable quantities in Asia Minor, at Broussa, Bourgas, and elsewhere, by immigrants from Roumelia.

In Provence the cultivation of the roses is at the present time a flourishing industry, and the otto prepared in that district is considered superior to the Bulgarian product. It is obtained from *Rosa centifolia* (a specimen of the plant used from Grasse having been determined by Dr. Blondel). This rose flowers there in April and May. Rose water is sometimes distilled from the yellowish tea rose known as the Safrano, which flowers in autumn and winter; but the water is very inferior, and the otto obtained from it is still more so, and unfit to mix with that of *R. centifolia*.

The cultivation of *Rosa centifolia* is carried on chiefly around Grasse, Cannes, Nice, and Valois by peasant proprietors, who sell the flowers to the distillers in the towns. The roses are grown in little hedges separated by paths 1 to 1½ meters wide. The flowers are gathered at the end of April, or about twenty days earlier than in Bulgaria, and the collection lasts twenty to thirty days. The collection commences at dawn, and the collectors, both men and women, are paid at the rate of 0.45 franc per kilogramme, the price in bad seasons rising even to 1¼ francs. The chief use of the roses is for making rose pomade, only a small quantity, comparatively speaking, being distilled for the otto. The flowers are distilled in large stills, such as are generally used for spirit, some holding as much as 150 kilos of flowers. Often one refrigerator receives the condensing pipes of several stills.

Usually 50 kilos of flowers and 300 liters of water are placed in the still at one time, and 100 liters are distilled over, the first 25 being the richest in oil and known as eau double de rose; the next 30 are of medium and the remaining 45 of inferior quality. The oil which floats is collected by means of a florentine receiver. The yield of otto is small, 10,000 kilos of flowers giving only a kilo of otto, and the price is about 1,000 francs per liter; the average price of the rose water is 2.60 francs per liter.

* Abstract from "Les Produits odorants des Rosiers," Dr. R. Blondel, Paris, 1889. After *Pharm. Journ.*

In Germany roses have been distilled for about five years in the neighborhood of Leipzig, about 6 hectares being at present under cultivation. The species employed is *Rosa centifolia*, and the amount produced in 1887 was 3,000 liters of rose water and 2 kilos of otto. The latter congeals at 20° C., and contains 32½ to 34 per cent of stearopten, which is in excess of that in Bulgarian otto. Indeed, the proportion of stearopten present in otto of rose is always greater in cold countries.

Formerly otto of rose used to be adulterated by mixing it direct with oil of gingergrass, but now the flowers are sprinkled with the oil when placed in the retort. The odors, under these circumstances, amalgamate better, and during the distillation the proportion of waxy (circeuse) matter that passes over is larger, so that otto thus obtained may solidify at 14° even when containing 25 per cent of oil of gingergrass. In this case, however, the otto appears muddy, and does not present the sparkling crystals characteristic of pure otto. The odor also is easily detected by an expert. Bromine turns pure otto of rose of a green color, but is itself decolorized by oil of gingergrass, and if a few drops of liquor potassæ are subsequently added an apple-green precipitate, in viscous clots, is formed in a colorless liquid, and the odor of roses is not altered; but if adulterated with gingergrass oil a yellow, milky precipitate is obtained in a reddish liquid, and a disagreeable odor is given off. This test, however, is qualitative rather than quantitative.

The presence of spermaceti or paraffin in otto is detected in Bulgaria by rubbing the small test bottle of otto, containing about 15 Gm., between the hands, when the essence rapidly liquefies, since a temperature of 18° C. suffices, whereas paraffin does not melt till 32° to 50°, and spermaceti at 46° C., and these remain undissolved at the bottom of the bottle.

Experiments made by Dr. Blondel show that pure otto of rose has some physiological effect. In the dose of 5 or even of 2 drops it produced cramp of the stomach in the absence of food. Taken after a meal it seemed to stimulate the digestive functions at first, but doses of 10 or 12 drops appeared to have an opposite action and caused marked flatulence. The only general effect noticed was a marked tendency to sleep. A guinea-pig, into which a cubic centimeter of otto was subcutaneously injected, died in four days after a state of profound torpor lasting forty eight hours. The only effect noticed in a post-mortem examination was a slight congestion of the meninges. In some persons the odor of the rose produces headache, and in rare cases severe symptoms, which are probably due to idiosyncrasy. The oil of *Andropogon Schœnanthus*, or Turkish oil of geranium, used to adulterate oil of roses, produces similar symptoms, but in a higher degree. With regard to the portion of the flower in which the otto is formed, observations made under the microscope by Dr. Blondel indicate that it is secreted by the epidermal cells. If a section through a petal is immersed in a one-half-per-cent solution of osmic acid for about twenty seconds, and then washed in distilled water and mounted in glycerin, the upper and lower epidermis are seen to be the parts distinctly blackened.

How Rubber Bulbs are Made.

It is commonly supposed by the uninitiated that the "bead," or raised line that encircles a bulb, shows the joining of the pieces of which it is made.

The fact, however, is that the pieces or original parts of the bulb are invariably joined at right angles to the bead line. Long bulbs, such as syringes and atomizers, are made of two pieces; round bulbs, as pumps and balls, are made of three pieces. New and unique styles that call for variation from the established modes are daily encountered.

A competent pattern maker, however, will find little difficulty, as a general thing, in so joining the parts as to secure the best results, both in vulcanizing, where the even swelling of the article must be considered, and in wear and tear, where the seams must run so as to be protected as much as possible by the general contour of the bulb.

After the pattern maker has decided by measurement and experiment upon the shape and size of the parts which go to form the bulb, zinc or galvanized iron patterns are made and given into the hands of the cutters. Mixed sheets of the required thickness being spread and afterward cut into convenient sides or squares, the bulb making begins. Each piece cut must have distinctly skived edges. Considerable care is necessary in this, as the strength of the seam depends upon the smooth fitting of the edges.

The three parts for hollow balls may, however, be cut with a die. The pieces, when cut, are arranged in large books with leaves of smooth cloth. If the bulb has a neck, small pegs of iron are first prepared by being cemented and wound with strips of rubber as a nucleus for the neck. The two or three parts of the bulb are then brushed with cement the whole length of the skived edge, after which they are thoroughly heated.

When thoroughly warmed and softened, the bulb maker, taking a prepared peg, places the neck of one piece on the opposite side, then presses them firmly together, and, rolling the whole tube-shaped piece between thumb and forefinger, has finished the neck of the bulb. The next process is that of knitting the edges which form the seam. Holding the finished neck toward him in his left hand, with the thumb and forefinger of the right he pinches the edges firmly together for nearly the whole distance round. The shape is now not unlike that of a "long clam." Into the side aperture, which is left open, is poured a little water or liquid ammonia. The opening is then made still smaller, and, as a final touch, the maker puts his lips to the orifice, and, puffing out his cheeks till they look like miniature balloons, blows full and hard into the inside of the bulb. The softened rubber, under this sudden pressure, expands, the flattened shape is lost in a fuller and more rounded outline, while the operator, with a quick nip of the teeth, closes the opening, the imprisoned air and water holding the sides apart in symmetrical corpulency.

There are those who can never learn the knack of blowing up a bulb with the mouth, but are obliged to use a bulb to inject the air.

After the makers have done with the now partly made bulb it is passed to the trimmers, who, armed with scissors with curved blades, carefully circle the seams, cutting away all unevenness, till the whole exterior is smooth and ready for the mould. In front of the trimmers are a number of shallow pans partly filled with chalk. Into these the bulbs are laid. A small dumbwaiter takes them down to the mould room and returns the empty pans. The bulbs on leaving the chalk pans are deposited in a small cylindrical box, which, turning a few times, powders them so effectually that the rubber cannot adhere to the inside of the mould. An experienced mould worker now taking one-half of a mould in his left hand, with his right gently forces the bulb into it, capping it with the second half. If the pattern maker has done his part faithfully, each will just fit its mould; if not, they will come out of the vulcanizer wrinkled, showing that it was too large; or if glazed and imperfect, that it was too small.

A flat iron ring or clamp holds the two sections of the mould together when in the vulcanizer. This is tightened by iron wedges, which are driven between the mould ends and the clamp. The moulds after being keyed are piled on cars that run upon small tracks into the vulcanizers, and are cured by steam heat. When the curing process is completed the vulcanizers are opened, and the cars, by a short extension of the track, are run under a simple shower bath, which quickly cools them. They are then unkeyed, the moulds twisted open, and the bulbs taken out. If the work be well done, the swelling of the liquid within its rubber prison has exerted so intense a force that every line and letter within the mould is reproduced upon the outside of the bulb, while the sulphur combining with the heat has sealed the copies with its magic spell.

The iron peg in the neck is next loosened by means of a blunt awl and slipped out, leaving the bulb perfect in shape. In the mould room are large car-like boxes, into which the bulbs are thrown. A box being full, it is trundled away to the cylinder room, where it undergoes a thorough scouring and polishing in huge slowly revolving cylinders.

When taken out of the cylinders the dirty yellow color which the bulb bore on leaving the mould has wholly disappeared. It now looks smooth, white, and finished. The neck being cut off the required length by a small adjustable cutter (devised expressly for the purpose), the bulb is ready for the market, or for the various fittings which accompany it as adjuncts to the syringe, atomizer, or other bulb. Where a smooth, clear-cut hole is needed in any part of the bulb except the neck, it is cut by a swiftly revolving punch. The neck hole is left by the iron peg, as already described.

A good illustration of the power of the imprisoned steam within the bulb may be obtained by knocking a clamp off a mould before it has been treated to a shower bath. The two hemispheres of iron will fly apart as if by magic, the bulb swells to treble its normal size and explodes with a loud report. The mould workers are sometimes badly burned by hot water which bursting bulbs scatter in all directions.

A well-made bulb, one that has just the right smoothness of outline, that is not scarred by imperfections in the mould, and that has the whiteness of a healthy cure, is an object that always wins the respectful admiration of rubber men. Toys, balls, and hollow goods generally are all made in the same manner as bulbs.—*Rubber World.*

Fluoride of Sodium.—This compound has been experimentally examined by Tappeiner with reference to its physiological action, particularly compared with that of sodic chloride and bromide. He found that it produced effects similar to those of the latter salts, particularly as regards the weariness, inclination to sleep, and the retarding of speech and mental processes. On the other hand, he observed that a 0.1 to 5-per-cent solution has a restraining influence upon the development of bacteria and cocci. —*Chem. and Drugg.*

Note on Hops, its Bitter Principle, and its Narcotic Properties.

AN interesting discussion took place recently at a meeting of the Society of Public Analysts (London), on the bitter of hops as distinguished from quassia bitter, and on certain hop substitutes. An elaborate paper on the subject was presented by Mathew A. Adams, which formed the basis for the discussion. Those portions of the paper which have a more direct interest for our readers are here reproduced, after the *Analyst* (July, 1890).

The proximate nature of the hop bitter is ascribed to several resins varying in intensity of bitter, but I hardly think its true nature has yet been positively and definitely made out. I suspect that a part, if not the whole, of this bitter is of the nature of a glucoside ; at all events this view fits in very well with the facts. For instance, fermentation removes a large part of the bitter, and on boiling a 2½-per-cent decoction of hop with 2½ per cent of sulphuric acid under a reflux condenser for two or three hours, every trace of bitter is entirely removed. But quassia and its allies are not at all affected by this treatment. This is the keynote of the distinction between the fixed and fugitive bitters—the latter being more or less of the nature of the glucosides, on this account disappearing by conversion into glucose in the acidified decoction, and in the mouth by digestion through the agency of the ferment proper to the saliva—and so we can now understand how it is that the palate, when dealing with a fugitive bitter, clears up so quickly, while, on the other hand, a fixed bitter, being unsusceptible of fermentative change, maintains its bitter effect so long.

As regards the argument that the fugitive character of the taste of hop bitter is due to its glucoside nature, allow me to draw your attention to the fact that salicin, a very bitter substance, but also a well-known glucoside, has this same fugitive characteristic in respect of taste, for when a saturated solution is placed on the tongue all bitterness soon vanishes.

The hop bitter, however, though it is of the nature of a glucoside, is by no means easy of conversion, so that prolonged boiling with sulphuric acid is necessary; and fearing that this somewhat severe treatment might possibly, to a certain extent, attack some of the fixed bitters, it seems as well to take advantage of the selective power of the basic acetate of lead to assist and hasten the removal of the bitter. [The author now describes his method of separation, etc.] . . .

Upon what authority does the statement rest that hops have a *soporific* effect? I have looked through all the books on materia medica that are at this moment accessible to me, and I can find very little justification for the imputation that the hop is soporific at all; the fact is, from a therapeutical point of view, the hop occupies a very humble place, so much so that by some modern writers, as Ringer, for instance, it is not even mentioned. This is what Garrod says: "Hops are tonic and stomachic and slightly narcotic; in the form of bitter beer, taken with meals, they form a useful aid to digestion in some cases of atonic dyspepsia. The volatile oil is probably the narcotic principle, and in the form of a pillow hops have been found anodyne and narcotic."

And Neligan says: "Much difference of opinion exists as to the therapeutical properties of hops; they are generally stated to be narcotic, but from the experiments made with them on animals by Majendie and others it would appear that this effect is not manifest when they are given internally, no matter how large the dose."

And Pereira says: "The odorous emanations (vapor of the volatile oil) of hops possess narcotic properties; hence a pillow of these cones promotes sleep, as I have several times witnessed." Moreover, we are told that stupor has occasionally been induced in persons who have remained for a considerable time in hop warehouses. The lupulinic grains are aromatic and tonic; they appear also to possess soothing, tranquillizing, and, in a slight degree, sedative and soporific properties. But the existence of any narcotic quality has been strongly denied by Dr. Bigsby, Majendie, and others. "I have tried it at different times," says Majendie, "both the lupulin (lupulinic grains) in substance and its different preparations, on animals, but I have never observed that it is a narcotic, although this property is one which is most strikingly displayed in experiments on animals."

As regards the reputation of the *hop pillow*, which has been handed down from book to book, it is very doubtful if there be much in it; for, although I live in the midst of the chief hop-growing districts, I never knew of its actually being put in practice. I quite believe that it is an old legend that gained more credence than it deserved, owing to the anecdote that King George III., being a sufferer from faceache, derived comfort and got sleep by the use of a hop pillow that a loyal subject of Kent presented to him. Be this as it may, so far as medical experience goes there is really nothing to countenance the idea that the hop, except in its volatile constituents, contains anything soporific, and in point of fact I do not believe the hop contributes to the finished beer, so far as the consumer is concerned, anything beyond a delicious aroma and an agreeable, salutary bitter.

Turpentine.

To obtain turpentine the tree is "boxed," or incised about a foot above ground to the extent of 7 inches deep, 3 inches wide, and 13 inches across face. The best season for boxing is from November 15th to March 1st, as the sap does not run during this time. The next step is that of "chipping" the tree with an instrument known as the "hack," which consists of a curved blade made of best steel, 2 inches wide and 2½ inches long, fixed into a handle from 1½ to 2 feet long, weighted at the opposite end, the whole weighing about 20 pounds.

The turpentine farm is divided into "crops" of 10,500 boxes, each worked by one man, who is required to go over his crop once a week and chip off one-half inch of sap wood and bark so as to expose fresh surfaces, for at the end of that time the turpentine almost ceases to exude. Trees are "chipped" only in the summer season, from March 15th to October 1st, as the turpentine flows only during warm weather.

Once every four weeks the crop is to be gone over by a second man, whose business it is to transfer the turpentine collected in the boxes to barrels. This "dipping" is done with a flat, heart-shaped steel attached to a four-foot handle.

In September the turpentine adhering to the face of the trees, and which has not run into the boxes, is removed. This product is distinguished as "Opaque," and amounts to about 25,000 pounds to each crop yearly. The collected turpentine is transferred to stills made of copper one-sixteenth to one-eighth inch thick, and holding from 10 to 16 barrels of crude.

In Willcox County the still is bricked in over a large furnace which is level with the ground. To the cap (or neck) of the still is attached a condensing worm 100 feet in length, making six curls in a large tank of cold water, at the bottom of which is an exit for the distillate. The barrels of crude are taken, by means of skids, to the second story, and when the still cap is removed the head fastenings of a number of barrels are loosened and the contents emptied into the still. To prevent unnecessary wastage, these barrels are then inverted over a trough to drain. If the still contains "virgin turpentine" (or that collected from first year's chipping), less heat is required to complete the operation ; but when "yearling turpentine" (or that collected from second, third, and fourth years' chipping) is used, the heat must be increased. This distinction is due to the latter being more dense and containing more resin than oil in proportion ; therefore the yield of oil is not so great. During distillation, water, in quantities of 8 to 16 gallons to each barrel of crude, is gradually added through a small funnel arranged in the cap. This prevents the turpentine from scorching, besides clarifies the resin and improves its quality. When the turpentine is exhausted of oil, the cap is removed and the contents of the still are agitated for a while ; at length the gate at the bottom is opened, and the mixture of resin and impurities, such as small chips, bark, etc., flows out upon sieves arranged in tiers over a large trough, from which the melted resin is transferred to barrels made of rough material, for when the resin once becomes solid it requires but little stave support. The chips, etc., are removed from the sieves and burned.

The following is a brief summary of facts which may be of interest:

Three hundred boxes yield 1 barrel crude.

Five barrels crude yield 1 barrel oil (spirits).

Five barrels crude yield 3 barrels resin.

Resin from first year's yield is classed in commerce as W. W. (water white) and W. G. (window glass). Resin from second year's yield is classed as N. M. K., etc.

Oil (spirit) barrels are made to hold 50 gallons. The oil varies in price from 30 to 50 cents per gallon. Resin barrels usually hold about 280 pounds. It varies in price from $1 to $3 per barrel.—E. L. MURRAY, Ph.G. (Abstract of Inaugural Essay) in *Am. J. Pharm.*, 1890, 393.

Purification of Oil of Turpentine for Microscopical Purposes.

As it is difficult to obtain nice, clear oil of turpentine for microscopical purposes, I want to give other workers the benefit of my experience in rectifying the ordinary fluid. I proceed as follows:

Take 1 pint of common turpentine and mix in a quart bottle with 4 fluidounces of 98-per-cent alcohol. Agitate well and let stand until the two fluids separate. Decant the turpentine (which will form the lower layer) from the alcohol, and mix it with 1 pint of clear water. Agitate thoroughly and let stand until these two fluids separate, then from the water decant the turpentine (which this time will form the upper layer), and finally mix with the turpentine about 1 ounce of powdered starch, and filter through paper.

By pursuing the foregoing plan, any one may secure a pure, limpid, and brilliant turpentine. The alcohol used in purifying it need not be wasted, as it will do to burn, to clean slides, or for other purposes.

I usually make a large quantity and recover the alcohol by distillation.—CHAS. C. PARIS in *The Microscope*.

On the Formation of Iodoform from Acetone, and the Analytical Determination of the Latter.

THE production of iodoform from acetone is based upon the following reaction, first discovered by Lieben:

$$\underset{\text{acetone}}{CH_3COCH_3} + \underset{\text{iodine}}{6I} + \underset{\text{soda}}{4NaHO} =$$

$$= \underset{\text{iodoform}}{CHI_3} + \underset{\substack{\text{sodium}\\\text{iodide}}}{3NaI} + \underset{\substack{\text{sodium}\\\text{acetate}}}{NaC_2H_3O_2} + \underset{\text{water}}{3H_2O}$$

A recent study of this process, by G. Arachenesque, has shown that all the acetone can be converted into iodoform, but only when there is more than the theoretical quantity of iodine present.

If acetone is to be determined quantitatively, for instance in methylic or wood alcohol, it is advisable to have not more than 1 per cent of acetone present, if trustworthy results are expected. When its percentage has been found by preliminary trials to exceed this, the original liquid is suitably diluted by means of water until a liquid of the proper degree of dilution is obtained. Of this, 5 C.c. (corresponding to a certain known volume of the original liquid) are poured into a globe funnel with stopcock, and next are added 10 C.c. of solution of soda of double volumetric strength (or 80 Gm. in 1 liter) and 5 C.c. of doubly-normal volumetric solution of iodine. After shaking, another like volume of soda and iodine is added, and this is continued until after renewed shaking no more iodoform is seen to render the supernatant liquid turbid. The stopcock of the funnel (which should be some distance from the neck) is then opened, and the iodoform which had settled down is run out into a burette having at its bottom a pellet of asbestos, which allows only the liquid to pass. After the pellet is washed the iodoform is dissolved out by ether, the latter evaporated, and the iodoform weighed.—*Compt. Rend.* and *Chem. Centralbl.*

The Occurrence and Extraction of Ozokerite in Galicia.

THE most important deposit of ozokerite is near Borislaw, where it occurs in a marl containing salt. The wax is found in irregular lumps, sometimes of great size, or in layers which frequently die out completely. The neighboring rock consists of clay-slate marl and sandstone.

The centre of the basin is richest in wax; in some cases masses of such extent have been tapped that the miners have hardly had time to escape before the workings were filled with the plastic mineral. Such a deposit was recently found in the deepest shaft at Borislaw, at a depth of 208 meters (227 yards). In general, however, the yield of wax varies at from 2 to 8 per cent of the mineral extracted. Ozokerite was first found in this district in 1854 by Doms, who was in search of petroleum, with which much of the ground is saturated. At first it was regarded as an unwelcome companion to petroleum, as it frequently caused the timbering of the shafts to collapse.

It was not until about twenty years later that this substance began to attain commercial importance, a method having then been discovered of producing from it a substance resembling beeswax, and named ceresin.

In 1865 ozokerite, which had previously been regarded as a crown mineral, was declared free, and the consequence was that a number of shafts were sunk in the district and much speculation ensued.

The land being parcelled out in small plots, the shafts were sunk in the immediate neighborhood of each other, and much waste and danger ensued.

In 1886 the present law was passed, according to which the right of mining ozokerite may be separate from the ownership of the land. The extraction is now carried out under official supervision.

In nearly every case the mineral is raised through vertical shafts or pits, over which a wooden roof is erected. The section of the shaft in the first instance is 3 to 4 square meters (32 sq. ft. to 43 sq. ft.), but when the ozokerite formation is reached an inner shaft, 1 meter square (10.76 sq. ft.), is formed of timber, and the space between this and the timbering of the larger shaft is filled with a rich clay.

This construction is adopted to exclude the surface water, which is kept down by hand pumps during sinking.

From the bottom of the shafts levels are driven into the ozokerite ground, the richer portions being raised and the refuse used to fill up the old workings.

The softer parts of the marl are dislodged by means of pick or wedge; but where the rock is hard, and the permission of the mining authorities can be obtained, dynamite is used.

The mineral is raised by hand in skips or tubs holding 40 to 50 kilos (88 to 110 pounds). Hand ventilators are used for the purpose of ventilation, but explosions of gas are not uncommon, especially after Sundays and holidays.

Fatal accidents are, however, rare. Safety lamps are used in all the mines. The timbering of the shafts requires constant renewal and repairs; in some cases it is almost impossible to keep the shafts perpendicular.

The water is usually raised in tubs, and much difficulty is experienced in getting rid of it after it reaches the surface, on account of the numerous shafts and the broken nature of the ground.

The mineral when it leaves the tubs is sorted by hand. The waste rock is picked out and tipped to spoil, lumps of ozokerite are specially selected, and the remainder of the rock, containing fragments of wax, is tipped into tanks full of water. On being well stirred the most of the wax rises to the surface and is skimmed off. The residue still contains from 2 to 3 per cent of wax.

The quantity of waste mineral being considerable, and the distance between the shafts small, a special railway has been built to remove the residues from the immediate neighborhood of the mines.

Only one attempt has been made to mill on a large scale for ozokerite. In this case a circular shaft 2 meters (6 ft. 7 in.) in diameter, and lined with iron tubing, was sunk outside the ozokerite zone, and the deposit was reached by galleries. Trucks holding 500 kilos (1,102 pounds) were used, and both ventilation and pumping were done by steam power.

The operations on a large scale do not, however, seem to have been successful, the French company which carried them out having now ceased working.

The production of ozokerite in the Borislaw district amounted in 1887 to 96 per cent of the total output in Galicia, and was valued at £152,900.—J. SHOTSKY, in *Allg. Oest. Chem. und Tech. Zeit.;* after *J. Soc. Chem. Ind.*

The Purity of Antifebrin.

IT is strange that warnings should only just now be heard of the dangers of antifebrin, or acetanilide, after it has been for so long a time in commerce.

The number of more or less pronounced acute poisoning cases with the preparation has given rise to a more intimate investigation of its properties and action, both from a physiological and therapeutical point of view.

In this way it has been ascertained that nearly all the acetanilides of commerce are impure, not having the true melting point, and it is believed that all the untoward symptoms are to be ascribed to foreign compounds, specially to toluidines present as impurities.

One case has been reported where a student took no less than an ounce of antifebrin, "chemically pure," with impunity, which would not have been the case if the specimen had been impure.—BERLIN CORRESPONDENT of *Chem. and Drugg.*

Behavior of Paraffin towards Certain Solvents.

PAWLEWSKI draws attention to certain peculiar features which paraffin exhibits when dissolved in certain volatile menstrua. The experiments of the author were made with the white paraffin obtained from ozokerite, also called white ceresin. This had a specific gravity at 20° C. of 0.917. Its melting point was at 64°–65° C., and its congealing point at 61°–63° C. In its solutions, presently to be described, this paraffin showed every evidence of belonging to the so-called colloid substances.

A 1-per-cent solution of paraffin in benzol, obtained at a temperature of 20° C., when cooled to 5°–7° C. congeals to a homogeneous jelly which cannot be poured from the containing vessel. A similar solution, of 2.2 per cent, yields so firm a jelly that it is able to bear a weight of several grammes without losing coherence. Solutions of paraffin in xylol (para) behave in the same manner.

A solution of 3.53 Gm. of paraffin in 100 Gm. of chloroform, prepared at 26°–27° C., when cooled to 18° C. furnishes a jelly so dense that it can bear a weight of 300 Gm. without being ruptured. The paraffin which has separated in this kind of jelly is very much swelled up, similar to gelatinized starch. Solutions of paraffin in carbon disulphide and in oil of turpentine show the same behavior.

Most characteristic is the action of ether upon paraffin. On pouring ether upon thin shavings of paraffin, prepared with a razor, and thoroughly mixing, the shavings will disintegrate and form a fine powder, part of the paraffin passing into solution. After the solution has stood from 12 to 20 hours, and the temperature has slightly fallen (2° C. is sufficient), the dissolved paraffin separates in strongly swelled flakes, very similar to a jelly.

When paraffin separates from the before-mentioned solvents, not a sign of crystallization can be observed either with the naked eye or under the microscope. It is otherwise when acetic acid is used as solvent. Solution of paraffin in this liquid, whether saturated or not, deposits the paraffin, on cooling, in form of small laminæ, which separate perfectly from the solvent. This is even the case when a boiling solution is cooled off. Towards acetic acid, therefore, paraffin acts like a crystalloid. The colloidal nature of paraffin explains its presence as "vaseline" in crude petroleum.—After *Berichte*, 1890, 327.

Micro-Chemical Distinction of Alkaloids and Proteic Matter.

In the study of the localization of alkaloids in plants, which is a very important one from the standpoint of vegetable physiology, there sometimes occurs a great difficulty resulting from the fact that certain alkaloids are not possessed of special characteristic reactions.

Although we can have recourse to general reagents only, it must not be forgotten that, without mentioning certain amines and glucosides that are precipitated by iodine, the general reagents of the alkaloids also precipitate most of the proteic matters.

Here is a point that the best chemical works neglect to bring into prominence, and one to which Mr. L. Erreva, who has given much study to the localization of alkaloids in plants, has paid particular attention. In order to supply the existing want, Mr. Erreva proposes to have recourse to solvents of which the use is based upon the fact that the acid salts of the alkaloids are soluble in alcohol, while the proteic matters are not; in fact, among the latter there is scarcely any save gluten fibrin (extracted by Ritthausen from the gluten of cereals) that seems to form an exception. This is reputed to dissolve in absolute alcohol, but in very minute quantity.

Mr. Erreva's experiments have shown him that alcohol acidulated with tartaric acid (recommended by Stas for the micro-chemical extraction of alkaloids) very well realizes the double desideratum, that of dissolving the alkaloids and precipitating proteic matter so as to differentiate them micro-chemically. For the preparation of the reagent Mr. Erreva recommends the following proportions:

Crystallized Tartaric Acid	1 Gm.
Alcohol	20 Cc.

Absolute alcohol might be used. In certain cases it precipitates the peptones more completely than the tartaric acid solution does, but it afterward gives less marked precipitates, especially with iodine, and it does not dissolve the alkaloids so well.

Alcohol acidulated with hydrochloric acid (recommended by Gautier) gives excellent results in the dissolving of alkaloids, but it is not so well adapted for the precipitation of proteic matters. In fact, as Hoppe-Seyler remarks, the peptones are not precipitated from their aqueous solutions in the presence of free hydrochloric acid.

The alcoholic solution of tartaric acid therefore merits the preference. As for the manner of operating, that consists in soaking in this liquid, for twenty-four hours, sections thick enough to contain one layer of entire cells. The sections are removed from time to time and placed in distilled water and treated with the general reagents—iodide of potassium, double iodide of mercury and potassium, phosphomolybdic acid, etc. If it is a question of alkaloids, these will have been removed by the alcohol, and the general reactions will not have occurred; but if, on the contrary, it is a question of proteins, these will have remained in the cells, and the reactions will have been obtained as before.—*Revue Scientifique* and *Scient. Am. Suppl.*

Distribution of Solanine and its Micro-chemical Reactions.

M. E. Wotczal has published an elaborate paper on this subject in Russian. He finds only three trustworthy tests for the presence of solanine, viz.:

1. Mandelin's vanadin-sulphuric acid, *i.e.*, 1 part of ammonium-metavanadate in 1,000 parts of trihydrate of sulphuric acid ($H_2SO_4+2H_2O$). The test is one of extraordinary delicacy; if the preparation contain solanine, it goes through the following series of colors: yellow, orange-red, purple-red, brown, pure red, violet, blue-green, and then disappears altogether.

2. Brandt's reagent: 0.3 Gm. sodium selenate in a mixture of 8 C.c. of water and 6 C.c. of pure sulphuric acid. If the preparation containing solanine is first warmed, then on cooling it becomes first violet-red, then orange-red and yellow-brown, the color finally disappearing.

3. Pure sulphuric acid as a macro-chemical reagent; but this test has no advantage over the other two.

Solanine was found in nine species of Solanum and three of Scopolia. In the tubers it is found chiefly in the neighborhood of the "eyes." In the vegetative portions it occurs in greatest abundance in the young tissues, and in the mature tissues it is usually entirely wanting except in the neighborhood of the buds and of the origin of the roots.

In the floral organs the reverse is the case, the quantity of solanine increasing for a time in both calyx and corolla as the flower opens, but ultimately disappearing from these organs, while it continues to increase in the green, unripe fruit, diminishing again when the fruit is ripe, and being then localized chiefly in the peripheral layers.

The seat of the solanine is the cell cavity, where it occurs in the form of a soluble salt, and from which also it penetrates the cell wall by diffusion.

The author regards solanine as a product neither of primary synthesis nor of disorganization, nor as a secretion or excretion, nor as a reserve substance, nor as a transporting form like asparagin, but as an intermediate stage in the series of chemical changes which the already formed plastic substances undergo in the living cell. In the flowers and unripe fruits it undoubtedly also serves as a protection against consumption by animals.—After *Pharm. Journ.*

Chromic Acid as an Alkaloidal Reagent.

In a recent issue of the *Pharmaceutische Zeitung*, K. Mezger gives particulars of the use of a 5-per-cent solution of chromic acid in testing alkaloids, especially cocaine. If to a solution of three-quarters of a grain of cocaine hydrochlorate in 80 minims of water 5 drops of the chromic acid solution be added drop by drop, a distinct precipitate forms, which redissolves without delay; but the addition of 16 minims of hydrochloric acid throws down a dark orange-colored precipitate of cocaine chromate. It is noteworthy that ecgonine hydrochlorate solution remains clear with chromic acid, and also remains clear with 92-per-cent solution of potassium chromate; so does cocaine. On the other hand, quinine, quinidine, and cinchonine salts give a yellow precipitate with the chromate, as also with the chromic acid solution; but it is noticeable that in the latter case the precipitate dissolves in hydrochloric acid and crystallizes out again. Cinchonidine also affords the same, but with potassium chromate only turbidity and finally crystallization.

With apomorphine, chromic acid gives a red-brown precipitate, which turns green in a short time; the addition of hydrochloric acid changes it to dirty brown; brucine gives a yellow precipitate, hydrochloric acid changing it to orange-yellow, the solution itself being red; strychnine gives a yellow crystalline precipitate on standing, which is not affected by the acid; veratrine gives a yellow precipitate. Atropine sulphate and the hydrochlorides of caffeine, pilocarpine, and codeine give no reactions with these reagents. Morphine hydrochloride gives a green coloration with all three reagents. These tests are sufficiently distinctive to warrant careful trial with, and advanced students may find them useful as group tests.—After *Chem. and Drugg.*

Note on a Test for Physostigmine.

John C. Umney contributes a note on a test for physostigmine to the *Pharm. Journ.* (June 28th), from which we take the following.

Whilst working recently through the tests of the pharmacopœial (Brit. Pharm.) alkaloids, all were found to conform readily to the various requirements mentioned in that work, with the one exception of physostigmine. The Pharmacopœia in reference to this alkaloid reads thus: "The aqueous solution has an alkaline reaction, when warmed with or when shaken with dilute solution of potash becomes red, and when evaporated to dryness over a water bath leaves a bluish residue, the acidified solution of which is beautifully dichroic, being blue and red." The first and second tests were found perfectly satisfactory, but the last was quite the reverse. The aqueous solution neither left a bluish residue nor was its acidified solution in the slightest degree dichroic.

Being dissatisfied with the result of the test, I sought to ascertain the reason of its failure. The first thing that suggested itself was whether the pharmacopœial statement might not be considered a little ambiguous, and whether it was not "the solution after shaking with potash" that should give a bluish residue. But in this case the residue was of a dirty brown color and its acidified solution not in the least dichroic. [Mr. Umney thought that possibly his alkaloid was at fault. But this turned out not to be the case. On consulting Prof. Attfield, the latter informed him that undoubtedly an alkali was needed, and advised the use of ammonia.]

The reaction was therefore performed, adding ammonia to the aqueous solution before evaporation, and the bluish residue was satisfactorily obtained, the acidified solution of which was beautifully dichroic, blue and red.

Further experiments were made with solutions of the hydrates and carbonates of potassium, sodium, calcium, and barium, all of which redden the solution of the alkaloid, but in no case was a bluish residue obtained on evaporation; whilst with other salts—as well as hydrate—of ammonia the bluish residue is an ammoniacal compound with the alkaloid. On referring to the French Codex, the only other pharmacopœia in which the alkaloid physostigmine itself is official, I find a very similar test described, ammonia being necessary for its development. From the foregoing it will be seen that there is an omission in the text of the Pharmacopœia of the "ammonia." It is suggested, therefore, that the test in future editions should read "when evaporated to dryness over a water bath *with ammonia* leaves a bluish residue, the acidified solution of which is beautifully dichroic, being blue and red."

A MODIFIED FORM OF PINCHCOCK.

As is shown in the cut, the modification consists in making a side bend in one of the limbs and omitting the double wire which serves as a guide in the ordinary form. The pinchcock can be opened by springing the limbs apart, and thus is readily put on a tube connected at both ends without breaking connections, and, when placed so that the tube lies in the side bend, leaves the tube open while retaining its place. The side bend was suggested by a note in *Ztsch. Anal. Chem.*, xxiv., 399.—J. T. STODDART in *Chem. News*, 1890, 224.

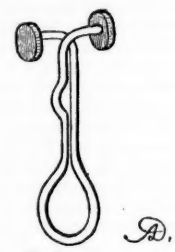
A NEW TEST-TUBE HOLDER.

THE annoyance experienced in using the common wooden test-tube holders led me some years ago to attempt to devise a holder which should serve its purpose more perfectly. The wooden holder is clumsy, its rubber band rots and is liable to give way at awkward moments, the peg becomes unglued and drops out, and even in its best estate it holds securely only medium sized test tubes. Tubes of more than 2 Cm. cannot be inserted sideways, larger ones are not taken at all, and a separate holder must be used for small test tubes and ignition tubes.

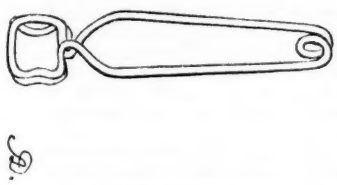
The new holder has been in use in my laboratory for four years now, and has given such good satisfaction that I venture to call attention to it in a form recently somewhat improved.

It is made of brass wire, and opens by pressure on the straight sides of the handle; its jaws open to the width of 5 Cm., and it holds firmly any tube from 5 Mm. up. It thus serves for ignition tubes as well as for all sizes of test tubes.

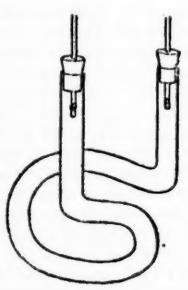
I have recently had a larger size made of stiffer wire for the purpose of holding flasks, etc. It proves very convenient as a holder of wash bottles when one is washing with boiling water, and also for holding beakers when decanting hot solutions. Both sizes are furnished by the Victor Manufacturing Co., Northampton, Mass. — J. T. STODDART in *Chem. News*, 1890, 223.



Pinchcock.

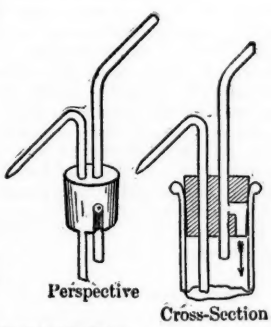


Test-tube Holder.



Absorption Tube.

Inlet tube



Perspective

Cross-Section

Wash-bottle Valve.

A SELF-SUPPORTING ABSORPTION TUBE.

STOLBA uses absorption tubes (for drying gases, etc.) of the shape shown in the cut. A portion of the tube is bent into a flat spiral, upon which it rests when placed on the laboratory table. The two tubes passing through the stoppers are closed at the inner orifice, but have an aperture a short distance above the end. It is only necessary to draw up either tube so that the aperture is within the stopper, when the current of gas will cease to pass.— After *Zeitsch. f. ang. Chem.*

A NEW VALVE FOR WASH BOTTLES.

IN view of the fact that metallurgical and technical chemists have daily occasion to use hot acids, ammonia, and other fuming liquids in the washing of precipitates, a wash bottle which will automatically throw a prolonged stream of liquid and retain all disagreeable fumes will be appreciated by the fraternity. A strong objection to the use of a rubber bulb attached to the wash bottle is the fact that a slight rise in the temperature of the room will force the liquid out of the bottle; while the ordinary rubber valve, as described by Blair in the "Analysis of Iron," will swell and become useless in a short time when exposed to the fumes of hot acids. A very simple apparatus can be made in a few minutes which obviates both these difficulties.

A rubber stopper, doubly perforated, and of such size that it will project about a quarter inch above the neck of the wash bottle, is chosen, a lead pencil or penholder passed into one of the holes, and a small hole drilled through the side of the stopper till the borer meets the wooden plug.

A wedge-shaped channel is then cut in the side of the stopper from this side hole to its lower end. A piece of glass tubing is now closed at one end and a small opening about the size of a pin's head made in the glass an inch from the closed end. This can be easily done by a small flame directed upon the surface of the glass, while air is blown into the tube. This small opening is made level with the rest of the tube, and the glass is bent at the regulation angle about two inches above this opening. This is then placed in the rubber stopper so that the hole in the glass tube and that cut in the stopper will coincide.

An exit tube for the escape of the liquid is made as usual, and the tubes and stopper placed in the neck of the wash bottle in such a way that, when air is blown in, it passes through the side hole in the stopper, down the wedge-shaped groove, and forces the liquid up the exit tube. A very slight rotation of the inlet tube, after the liquid has begun to flow, will close the valve, and the pressure of the enclosed air will maintain the stream, which can instantly be stopped by reversing the rotation.

If the apparatus is well made, the angle of rotation of the inlet tube is very slight, not over twenty degrees.

I have had this apparatus in use for several months, and find that it does not get out of order, is much easier to handle, and saves more labor in the washing of precipitates than any other form of wash bottle. The inlet tube is so small that no appreciable evaporation of ammonia occurs, nor does a rise in the temperature of the laboratory result in an undesirable washing of the working benches.—DAVID H. BROWNE in *Journ. of Anal. Chem.*, 1890, 141.

Thiol.

THIS odorless substitute for ichthyol appears to be gaining ground in Germany, if we may judge from the literature on the subject.

In a long paper recently communicated to the *Deutsch. Medizin. Wochenschr.*, Dr. A. Bidder gives particulars of fifty-five different cases of skin affections of various kinds in which he has used thiol with success, and Professor Ernst Schwimmer, of Budapest, speaks highly, in *Therapeutische Monatshefte*, of its efficacy in the treatment of acne and similar affections, for which he uses the thiol mixed with three times its weight of water, the solution being painted on the parts twice or three times a day.

In some cases of erythema it is advantageous to use the thiol in more concentrated form, viz., in powder.

In eczema rubrum the application of an ointment composed of thiol 1 part, and lard 10 parts, quickly gave relief, and it seemed to be better, on the whole, than ichthyol.

Thiol is sent into the market in three forms, viz., liquid, powder, and scales.—*Chem. and Drugg.*

Capsicum as a Counter-Irritant.

DR. HENRY J. BUCK, writing to the *Lancet*, says: I have used this drug for more than twenty years—I may almost say daily—and many of my patients will not travel without a bottle of the "magic lotion," as they call it.

I find the simplest and most efficacious way of applying it is to soak a large handful of the crushed pods in half a pint of hot water for an hour, then strain and bottle for use. A teaspoonful of eau-de-cologne added will keep the solution, or it can be well boiled after preparing. I then have it applied to the affected parts on a piece of linen folded three or four times, or on lint, and covered with gutta-percha tissue or a dry flannel. In this way the lotion may be kept on for hours without vesicating, and in many cases the skin is hardly reddened. The stinging and burning sensation produced by the capsicum lotion is, after a few minutes, welcomed by the sufferer, so magically does it often remove the rheumatic or neuralgic pain for which it is being applied. In acute torticollis a cure is often speedily obtained by covering the side affected with the application. In any form of neuralgia, rheumatism, subacute gout, pleurodynia, and such like, it will be found most useful, and may be reapplied over and over again during the day and night without any fear of vesication.

American Pharmaceutical Association.—From present prospects, the next meeting, to be held at Old Point Comfort, Va. (Sept. 8th–12th), will be attended by a very large number of members.

Lavender in Sussex.

LAST winter Mr. J. Ch. Sawer, pharmaceutical chemist, of Brighton, exhibited fair specimens of lavender and rosemary oils distilled from plants grown by himself near Brighton. This was a new industry in that quarter, and it has attracted some attention locally as well as in pharmaceutical circles. An attempt is now being made to extend lavender cultivation in Sussex. Some parts of the county appear to be very suitable for the industry, for lavender being a plant indigenous to hill-slopes bordering the Mediterranean basin, the probability is that a locality near the sea is advantageous. The soil most suitable, according to Mr. Sawer's experience, is light loam over chalk, even if the depth of such soil be only eight or twelve inches. It is noticeable that although a deep, rich soil produces larger plants, a comparatively poor but well-drained soil yields more *flower*, and the flowers are sweeter; and sloping from north to south is preferable to that sloping from east to west—a slope is in all cases preferable to a flat land or a hollow.

Several varieties of lavender may be found in gardens which to an experienced eye appear similar when not in flower. There is a variety cultivated for "bunching," but its flower spikes are considerably smaller than the true variety cultivated for distillation. There is also a variety grown as a border plant on the sea wall at Hoye which is absolutely valueless as regards its flower, although more compact in growth. An acre of land properly planted will grow 2,500 plants, and yield, on an average of six years, 24 pounds of oil per year. An extra thousand plants can be crammed in, but, being cramped for room, they choke each other, they suffer for room on the third year, and may not survive the fourth; whereas if generously allowed space they will flourish for six or seven years. Wide spaces between the rows and between the plants allow a circulation of air, which prevents mildew and rotting, which the plant in a shaded or cramped position is subject to; a free space also allows the ground to be kept clear of weeds, and permits the harvest to be gathered conveniently.

The harvest takes place in August, and may last all that month. The flowers, deprived of as much stalk as possible, are distilled with water, without previous maceration, the same day as cut; the otto thus obtained is clear, limpid, of a very pale straw color, and its value, wholesale, is at present about 55*s.* per pound. As the demand for this oil is constant; and as the amount of land under lavender cultivation seems to have decreased rather than increased of late years, possibly owing to the increased value of land near London, where most of the old farms are found; and as in Sussex (so suited to its growth) there exists much land not cultivated at all, there is surely a chance of competing profitably in this little known industry.—*Chem. and Drugg.*

California Asphaltum.

ASPHALTUM is mined to a considerable extent in California, but the annual production is quite irregular, being governed by the local demand. When a great deal of iron pipe is being laid, large quantities of the substance are used in coating it. Asphaltum is found in the counties of San Luis Obispo, Santa Clara, Ventura, and Santa Barbara. Between 2,000 and 3,000 tons a year are shipped from the deposits.

The mines of the Ventura Asphalt Company, in the Canyon Diablo, Rancho San Miguelito, have come into prominence since 1888, when they were discovered. The material is found at or near the surface. About 1,800 tons have been so far shipped from this deposit. More or less prospecting work has been done, but now large cuts or tunnels are being run into the deposit. At the point now being worked the elevation above sea level is 1,300 feet, but frequent fossils of shells, sharks' teeth, etc., are found, showing that the mass came up from the ocean.

The vein or bed crops out at many points in the shape of fingers or rounded masses connecting with the main body, the width and length of which are unknown, but upon which breasts of 45 × 16 feet have been worked.

The quality of this asphaltum is unique, possessing as it does great toughness and hardness, and a larger amount of fixed bitumen than other known deposits. The percentage of fixed bitumen is 24.40. It fluxes readily in oil, coal tar, and by hydrocarbons, and may be made permanently of the hardness of stone or the pliability of india-rubber, according to kind and quantity of flux (solvent) employed and the manner and time of melting, etc.

It has been successfully employed in street paving, and is found not to soften by heat or crack by frost. It is in use for this purpose in several cities in California, Utah, Washington, British Columbia, Mexico, Guatemala, Sandwich Islands, and Australia. For cementing masonry it has been put to use in San Francisco, Santa Barbara County, and other places. The Southern Pacific Company built a piece of sea wall along the seashore, Ventura County, which was built up of round cobbles cemented together by this asphalt. Two years' trial shows no indications of the wall being injured.

A peculiarity of the Ventura asphalt is that it is elastic. The Santa Ana Water Company used it for plastering a reservoir, having first laid up a wall of cobblestones on puddle and then plastering this with hot asphalt. In this open reservoir no change in the material is seen; even in places where the wall settled and cracked, the coating stretched and bent, remaining perfect and sustaining the water pressure. A pile coated with this asphalt was driven at Goat Island without destroying the coating. In doing this, the weight of 3,000 pounds was dropped twenty-two feet on the pile. The material can be used for coating iron, planks, pipes, etc. Inquiries for the substance from the Eastern States, England, France, Australia, and Central America promise an important shipping business, unless other deposits with such exceptional properties are found.—*Min. and Sci. Press.*

Accidents with Kerosene Lamps.

WE take the following from an abstract of an official report by Sir F. Abel and Boverton Redwood on this subject ("Accidents with 'Paraffin' Lamps"), contained in the *Chem. and Drugg.*

The causes of explosions may be arranged under the following heads:

1. Rapidly carrying or moving a lamp, so as to agitate the oil, causes a mixture of vapor and air to make its escape from the lamp in close proximity to the flame, and, by becoming ignited, determines the explosion of the mixture existing in the reservoir.

2. Existence of an imperfectly closed filling aperture in the lamp reservoir favors explosion, owing to a vapor and air mixture being formed.

3. A sudden cooling of the lamp, owing to exposure to a draught, may give rise to an inrush of air, whereby the air space in the reservoir is charged with a highly explosive mixture, and the flame of the lamp may at the same time be forced into the air space. Blowing down the chimney to extinguish the lamp has the same effect; and if the wick be lowered very much, or the flame otherwise much reduced in size, the lamp may become heated, and its susceptibility to the effects described will be increased. Explosion in these cases is favored by the air passages being obstructed by dirt or charred wick, by the wick not being long enough to reach the bottom of the oil reservoir, and if the lamp is allowed to burn until the surface of the oil is scarcely level with the end of the wick.

4. The accidental dropping of the burning wick into the oil reservoir is a fruitful source of explosions.

5. If the flashing point of the oil used be just near the legal minimum, vapor is given off comparatively freely, but the mixture of vapor and air in the reservoir will probably be feebly explosive in consequence of the presence of an excess of the vapor; but if the flashing point of the oil be comparatively high the vapor will be less readily or copiously produced, and the vaporous mixture be more violently explosive. The effects are more violent if the quantity of oil in the lamp is small, and oil of high flashing point is more likely to cause heating of the lamp than one of low flashing point, in consequence of the higher temperature developed by the former, and of the greater difficulty with which some oils of that description are conveyed to the flame by the wick. It therefore follows that safety in the use of mineral-oil lamps is not to be secured simply by the employment of oils of high flashing point.

Sir F. Abel and Mr. Redwood state further that a loosely plaited wick of long staple cotton draws up the oil freely and regularly, and is altogether better and safer than a tightly plaited wick, and their experiments lead them to the conclusion that a lamp explosion is not usually sufficiently violent to cause the fracture of an ordinary glass reservoir, although in several recorded cases it has had this effect.

Lobeline.

To obtain the alkaloid from *Lobelia inflata*, the leaves are extracted with warm water acidified with acetic acid, the extract concentrated, made alkaline, and the alkaline solution extracted with ether. The acid extract is then treated with water, rendered alkaline, and again extracted with ether. After distilling off the latter, the alkaloid remains as a viscous, honey-colored oil, with a smell akin to that of honey and tobacco. For further purification the oil is dissolved in ether, extracted with water acidified with hydrochloric acid, the acid extract then rendered alkaline, and the resulting solution again extracted with ether.

After distilling off the ether, the residue is dried over caustic alkali and distilled in a current of hydrogen. When lobeline or its sulphate is suspended in a 10-per-cent caustic potash solution and a 4-per-cent solution of potassium permanganate is gradually added, the whole being gently warmed on the water bath, benzoic acid results, which can be extracted by means of ether after filtering off the manganic hydrate and acidifying the resulting solution. The identity of the acid formed with benzoic acid was proved by analysis and by its characteristic properties, whence it appears that lobeline contains an aromatic nucleus. Further investigations on lobeline are in progress.—H. PASCHKIS and A. SMIDT, *Monatshefte*, 11, 131; *J. Soc. Chem. Ind.*

Liquid Chlorine as an Article of Commerce.

THE recent improvements in methods for producing chlorine, on a large and economic scale, from chloride of magnesium, immense quantities of which are rendered available particularly at the extensive Stassfurt mines, have been instrumental in starting a new industry, viz., the manufacture of liquid chlorine and its easy transportation. Heretofore the production of chloride of lime and other substances requiring a continuous application of large quantities of chlorine gas, had to be conducted at the place where the latter was generated. Hereafter it will be possible to carry the gas, in a compact shape, to such factories or places as may require it. Of course, in the manufacture of chloride of lime it is not likely that the new method will displace the old one for some time to come. But chlorine is required for many other purposes; and if it can be transported without loss or risk there are many technical branches in which the chlorine will be preferred to chloride of lime. Indeed, as is well known, the latter is merely a convenient form of storing and handling chlorine. If the free chlorine obtainable from a hogshead of chloride of lime can be confined and transported in a vessel holding a quart, this will be a decided advantage.

The chlorine gas, after having been liberated by a simple process from the chloride of magnesium, is pumped into an apparatus where it is perfectly free from moisture by contact with sulphuric acid, and forced, under strong pressure and proper cooling, into a steel receptacle or fountain, in which the liquefied chlorine is stored and shipped.

It has been found that *dry* chlorine does not act upon cast iron, wrought iron, steel, phosphorus bronze, brass, copper, zinc, or lead, either alone or in presence of *concentrated* sulphuric acid.

For transport, liquid chlorine is best forced into iron or steel vessels. When the gas is wanted these vessels are connected with suitable conduits, so arranged that no moisture can reach the interior of the vessels.

Shaving Soap.

DIETERICH gives the following formula (in *Pharm. Centralhalle*) :

Beef Tallow	400 parts.
Cocoanut Oil	200 "
Sol. of Soda, sp. gr. 1.260	340 "
Sol. of Potassa, sp. gr. 1.260	60 "
Oil of Caraway	2 "
" " Bergamot	2½ "
" " Lavender	1½ "
" " Thyme	1 "

Melt the tallow and cocoanut oil together, cool to 50° C. (122° F.), add the alkaline lyes, warm gently, and stir during half an hour, or until the mass is uniform and homogeneous ; then incorporate with it the essential oils. Dieterich directs, besides, 5 drops of essence of myrobalans for each kilo of the mass. But this may be omitted.

Gum Arabic and Gum Senegal.

GUM ARABIC is often adulterated with gum senegal, the latter being sometimes sold in its stead. If the gum has not been powdered, the appearance is sufficient to show which variety is chiefly present. Gum arabic forms round or irregular masses, varying in color from colorless to brown, which reflect light strongly, almost appearing to be crystalline. Gum senegal is usually colorless or pale yellow, with a surface resembling ground glass, the pieces cylindrical or worm-like. It occurs occasionally in round masses resembling a mulberry.

On dissolving either gum in water, only small particles of wood are left, which, according to Kramsky, are usually red in the case of gum arabic, but black with gum senegal. Other gums, cherry for example, are only partially soluble in water, leaving a swollen residue which only dissolves after long digestion.

With potassium hydrate and a few drops of copper sulphate solution both gums give a blue precipitate, which in the case of gum arabic is larger in quantity, coherent, and rises to the surface, while the other is more flocculent and remains diffused in the liquid. The precipitates are only slightly soluble on heating, and are not reduced even by boiling. Dextrin yields a similar precipitate, easily soluble on warming, and which is completely reduced on boiling for some time. On prolonged heating with dilute potassium hydrate, solutions of gum arabic and of dextrin become amber colored; those of senegal are only slightly colored.

Mixtures of gum arabic and senegal behave to the copper test like senegal alone, but with potassium hydrate they assume the amber color. Mixtures of gum arabic or senegal and dextrin with the copper test behave like gum arabic alone, and if the amount of dextrin is not too small reduction takes place on boiling. When only small quantities of dextrin are present the copper precipitate, after thorough warming, may be filtered off and the filtrate boiled; reduction will then take place. When all three substances are present the precipitate should be washed, dissolved in dilute hydrochloric acid, and a large excess of alcohol added. The precipitated gum is allowed to settle for a day, washed with alcohol, dried, and examined as above.

Gum arabic may be systematically examined in the following manner : The powdered substance is treated with lukewarm water; a gelatinous residue indicates other gums. The aqueous solution is mixed with an excess of potassium hydrate and a few drops of copper sulphate, warmed and filtered, and the filtrate examined for dextrin by boiling; the precipitate being tested as above.

It is usually stated that gum senegal is more hygroscopic than gum arabic, but when dried at 105 C. gum senegal lost 13.39 per cent of water, and gum arabic 14.56; and on exposure to moist air for twenty-four hours the former gained 6.15 per cent, the latter 6.34.—L. LIEBERMANN in *Chem. Zeit.* (*J. Soc. Chem. Ind.*).

A Process for Purifying Alcohol and Alcoholic Liquids in General.

ACCORDING to this invention alcoholic liquids are freed from impurities by treatment with a basic tartrate followed by a hyposulphite (thiosulphate). Tartrate of potassium or sodium, or, preferably, the double salt known as Rochelle salt, may be used. Among the hyposulphites, those of barium and sodium have given excellent results. The alcoholic liquid, contained in a suitably closed vessel, is mixed with small quantities of the tartrate, being well agitated after each addition, until it reacts neutral or faintly alkaline to test paper. The impurities are now allowed to settle, which requires from a few hours to several days, according to circumstances; but in any case the operation is considerably hastened by the application of heat or by the action of light. Hyposulphite is now added in quantity equal to about one-third of the tartrate used. The liquid is well stirred and allowed to settle, when the clear portion may be drawn off and rectified in the usual way. This process is applicable to all kinds of alcoholic liquids, notably wines and rum, the flavor of which is greatly improved. Engl. Pat. 12,186 (issued to P. C. Rousseau and others).—*J. Soc. Chem. Ind.*

Oil of Nutmeg and Oil of Mace.

F. W. SEMMLER finds that the specific gravity of oil of nutmeg (which he obtained from Schimmel & Co., of Leipzig) is 0.8611 at 15° C. It consists of several terpenes. The vapor density was found to be 138, theory for $C_{10}H_{16}$ requiring 136.

Oil of mace consists of a number of constituents. Only the higher boiling ones are the carriers of the odor. The specific gravity is 0.9306 at 14° C. Among the constituents are the same terpenes as exist in oil of nutmeg; myristicol (containing oxygen); a stearopten having the odor of mace and possessing the composition $C_{12}H_{14}O_2$, which the discoverer names myristicin. (This name was formerly applied to a supposed stearopten reported to exist both in oil of nutmeg and oil of mace, but in this sense it is no longer recognized.)—After *Berichte*, 1890, 1803.

Estimation of Mercuric Chloride in Sublimate Dressings.

GUILLOT proposes the following method for determining the quantity of corrosive sublimate in dressings (*Journ. de Pharm.*, 1890, 542):

Carefully weigh 50 Gm. of the fabric or dressing, introduce it into a glass funnel (or small percolator), and extract it with alcohol of 80 per cent until a few drops of the percolate are no longer precipitated by stannous chloride. The alcoholic percolate is now evaporated in a porcelain capsule at a temperature of about 80° C., after addition of a little water and enough aqua regia to prevent the reduction of the mercuric chloride by some organic matter which has been extracted by the alcohol along with the mercury salt. When about 40 C.c. of liquid remain, it is passed through a filter and the filter washed first with water acidulated with aqua regia, and finally with pure water. The united liquids are placed into a conical glass vessel (provided with a stopper), supersaturated with ammonia, and then treated with sulphide of ammonium. The precipitate settles well at a temperature of 60° C. This is collected upon a small, unplaited filter of 9 Cm. diameter, previously dried at 100° C., and weighed. It is washed with distilled water until the washings no longer contain any chlorine or sulphide of ammonium, as shown by the failure of nitrate of silver to give any reaction.

Next the precipitate is washed with pure, highly dilute hydrochloric acid. This removes certain impurities, particularly ferrous sulphide. Washing with water is continued until no more iron is detected in the washings. The filter is finally dried and weighed at 100° C. It is advisable to insure the absence of free sulphur by treating the precipitate with carbon disulphide previous to drying.

By multiplying the weight of mercuric sulphide found with 1.168, we will find the amount of mercuric chloride in the 50 Gm. of fabric taken.

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EDITORIAL.

IT is now recognized by all who have had experience in the management of educational institutions, particularly of the higher grades, that a good library, accessible to those connected with the institution, is as important a feature as the staff of professors and lecturers. When the student has passed the point up to which all his time had been taken up with the acquisition of the fundaments of general or special knowledge, and when the period arrives at which he feels an incentive for independent inquiry and research, a well-stocked and readily accessible library becomes one of the most important factors in his education. Taking cognizance, for the present, only of those institutions which may be supposed to be more in affiliation with the majority of our readers, namely, colleges and schools of pharmacy, we can state that we have had ample opportunity, for many years past, to observe the benefits that may be derived by the students and others attached to such an institution from a good reference library. Students must not only be taught facts in the lectures, recitations, and at the laboratory tables, but they must also be trained to learn how to search through the existing literature for information on any subject that may be under consideration or discussion. This must be learned by practice and experience, like anything else, but it cannot be learned if the sources of information, that is, the reference works, are not at hand. But if they are, it soon becomes a pleasure and charm for the student to follow up reference after reference, and to accumulate abstracts or extracts covering the available information on the subject he is inquiring about, as far back as he finds it desirable or necessary to go.

There is, as yet, no school of pharmacy in this country which possesses what may be called a complete or perfect working library—such a library, for instance, as that of the Surgeon-General's Office possesses on the field of medical literature. Yet there are some which seldom fail to supply the desired information. Without intention to detract from the value of other libraries, it may be safely stated that, so far as a "working library" is concerned, that of the College of Pharmacy of the City of New York is not excelled by any other in the country. Care has always been taken to place on its shelves the most complete and exhaustive works in all departments of knowledge and art bearing upon practical or theoretical pharmacy, and its fundamental sciences, botany and chemistry. By carefully watching the tendencies of those who have occasion to consult it, the gaps which frequently reveal themselves are being gradually closed up, so that many a research may be begun and ended without necessitating a visit to any other library. We speak of this subject here for the reason that we have recently been consulted by gentlemen connected with two similar institutions regarding the most desirable works to form the foundation of a good reference library. Our advice has been somewhat detailed, more so than would be suitable for publication here. But the general principles which we at that time laid down may be quoted here, as they will no doubt be approved by competent judges.

1. In laying the foundation of a library—which has to be increased by gradual purchases as funds become available—the first care should be to procure the most important encyclopædic works, that is, those which treat of a science in the most complete and exhaustive manner. For instance, in chemistry, the large treatises of Roscoe and Schorlemmer (in English), Gmelin-Kraut or Graham-Otto (in German), should be procured; also Watt's Dictionary (English), Fehling's and Ladenburg's Dictionaries (in German), Beilstein's "Handbuch d. Organischen Chemie," and works of this kind, without which no research can be conducted. In botany, the fundamental works should be: Linné's works (best in form of Richter's "Codex Linnæus"); Decandolle's "Prodromus," with its modern continuation; Baillon's "History of Plants" and his botanical dictionary; Bentham and Hooker's "Genera Plantarum"; Engler and Prantl, "Pflanzenfamilien"; Gray's "Flora" and "Manual," etc., etc.

2. Every opportunity should be made use of to acquire sets of valuable periodicals, more particularly of those which are known to contain many important original papers. When an author's paper is to be consulted, the original should be referred to, and not some abstract or extract made from it in another periodical. While there will generally be but little difficulty in acquiring for the library the current issues of the more important literature—for instance, in chemistry the Journal of the Chem. Society, Chemical News, Amer. Chem. Journal, Berichte der Deutsch. Chem. Gesellschaft, Annalen der Chemie, Chemisches Centralblatt, Comptes Rendus, etc., etc.—the acquisition of complete sets of some of these and similar journals will entirely depend upon the availability of funds, which would have to be supplied in a rather large amount. However, this should or need not be done until the library has been further extended in other directions.

In pharmacy, besides the latest editions of treatises on practical pharmacy, and commentaries on the pharmacopœia (dispensatories), there should be procured the latest editions of the principal foreign pharmacopœias, with the best commentaries written thereon. It is much more easy to extend this part of the library, since the works which it may from time to time be found necessary to add are usually procurable with little trouble and without incurring great expense.

3. When the standard works for general reference have been procured, then the library may be extended in various specified directions. For instance, under Chemistry, it may be extended to analytical chemistry (Fresenius, Allen, Prescott, Classen, Curtman, Simon; The Analyst, Journ. of Analyt. Chemistry, Zeitschrift f. Analyt. Chemie, etc.). Under Botany, to medical botany (Bentley & Trimen, Luerssen, Baillon, Koehler's "Medicinalpflanzen," etc., etc.); to pharmacognosy (Maisch, Flückiger & Tschirch, etc.); also to materia medica, and to the literature of special subjects (Cinchona, Opium, etc.).

4. Care should be taken to procure and file all government publications that may be obtainable; all ephemeral publications, such as pamphlets, which are of any value. But no funds should be expended upon ordinary college text books or elementary works, as a reference library is no place for these.

5. If possible, all departments should be kept advancing at about equal rates. As soon as an important work appears which decidedly supersedes a work of reference

often consulted by users of the library, it should be procured.

6. While, as a general rule, care should be taken to procure reference works as far as possible composed in the language with which most of the users are mostly familiar, it is a cardinal rule not to regard the language it is written in if a particular work is the most exhaustive and best that has been written on some subject. The number of languages among which the choice usually falls, in the sciences which are to be represented in a library of a school of pharmacy, is very limited, and there will be no difficulty for any one who desires to consult a work written in one of these languages to find some one who will extract the desired information for him. The information is there ; it is only a question of how to get it out. But if the information is wanted, and the book it can be obtained from, even at some trouble, is not there, the research is cut off at the very beginning.

FLUOROFORM has recently been announced as a new discovery by Meslans (see page 165 of this number). So far as publication is concerned, the priority appears to belong to this author. But the discovery itself is not new, having been made some five or six years ago by Prof. Charles O. Curtman, of St. Louis, Mo., who prepared the gas by means of iodoform, and exhibited it to members of the senior class of the St. Louis College of Pharmacy; also to Dr. Frerichs, a former assistant of Prof. Woehler. He also announced the discovery at a meeting of the Verein Deutscher Aerzte of St. Louis.

Conversion of Tropidine into Tropine.

LADENBURG announces (*Ber.*, 1890, 1780) that he has succeeded in producing from tropidine a strong base which, when treated with tropic and hydrochloric acids, yielded a substance having the characteristic properties of atropine. He believes that it is tropine, but merely announces the above facts—without being at present sure of the tropine—to save priority. It will be remembered that tropine is a direct decomposition product of atropine (which can be split into tropine and tropic acid), and that it is the only link yet wanted for the synthetic production of atropine.

The Phenylhydrazin Test for Sugar in the Urine.

DR. J. A. HIRSCHL has taken up the defence of the phenylhydrazin test for sugar in urine which was first recommended by Prof. Jaksch, of Prague, and which has since then been declared by several authorities as not fully reliable.

When phenylhydrazin is brought in contact, under certain conditions, with sugars (dextrose, levulose, lactose, etc.), it enters into a chemical compound with them. These compounds have a characteristic color, are crystalline, and are very permanent. With dextrose or glucose, phenylhydrazin forms a substance known as phenylglucosazon. This crystallizes in yellow needles, which are either single or grouped in bunches. Sometimes this compound, formed as a precipitate, appears to the naked eye to be amorphous, but when viewed under a lens the crystalline character is at once perceived.

In the case of urine containing sugar, there is often produced, under certain conditions, a precipitate consisting of various-sized yellow lamellæ or brown globules strongly refracting light, which must not be confounded with the sugar precipitate.

It is this secondary precipitate which has induced other experimenters to regard Jaksch's reagent as unreliable. Hirschl has now ascertained the conditions under which the secondary precipitate may be best distinguished from the principal one, when sugar is present.

Introduce 10 C.c. of the suspected urine into a test tube, add about 5 grains of the phenylhydrazin hydrochlorate and 10 grains of sodium acetate, and promote solution by warming. Then place the test tube into a boiling water bath, and allow it to remain therein for one hour. Then remove it, set it aside, well corked, for several hours or over night, and examine the sediment under the microscope.

If no sugar was present, the sediment contains no yellow crystals, but is amorphous, brownish-yellow or brown, soluble in alcohol and insoluble in water.

If sugar was present, the amorphous precipitate just mentioned is mixed with more or less of the characteristic yellow crystalline needles of phenylglucosazon.

The delicacy of this reaction no doubt exceeds that of any other one known. In aqueous solutions of pure glucose the limit of the reaction is at 0.003 per cent. In urine, however, less than 0.03 per cent cannot be recognized. This is 1 in 3,333.

The author points out that hydrochlorate of phenylhydrazin, which was recommended by E. Fischer, is preferable, for this test, to the acetate, which was originally proposed by Jaksch.—*Zeitschr. f. phys. Chem.*

QUERIES & ANSWERS.

Queries for which answers are desired, must be received by the 5th of the month, and must in every case be accompanied by the name and address of the writer, for the information of the editor, but not for publication.

No. 2,472.—**Indigo-Blue Hectograph Ink** (Several Inquirers).

We have, for some time past, been using a new kind of ink for polygraph purposes. Having become dissatisfied with the ordinary violet ink, and desiring to replace it by a blue one, we tried at first every kind of blue aniline color accessible in the market. None of them, however, was fully satisfactory, some being too dull in color and others not being lasting enough, that is, yielding only a small number of good copies. It occurred to us next to try to combine several colors, not exactly with a view to obtain a blue, but rather a very dark and persistent green color. In one experiment we found to our surprise that the addition of green to methyl violet, in certain proportions, resulted in the production of a very handsome blue. The reason of this, in our opinion, is that the green neutralizes the red of the violet, which latter is composed (mainly) of red and blue, and that, therefore, the blue tint alone remains. The tint is, however, much intensified by the presence of the neutralized mixture of green and red. After some further trials we found the following combination to produce the best results, furnishing an ink which yields polygraphic copies of a very fine, brilliant indigo or "navy" blue. The names of the colors are those used in the trade.

Brilliant Green, crystals	3 parts.
Hofmann's Violet, 4 B.	3 "
Glycerin	1 part.
Water	10 parts.

Mix the two coloring matters in a mortar, and reduce them, if in lumps, to a moderately fine powder. Transfer this to a tared flask, add the glycerin and water, and heat the flask on a water bath, frequently agitating, until the colors are dissolved. Then allow the flask to cool, replace it on the scale, and restore the loss of water. Transfer the product to small vials.

Since a little of this ink lasts a long time, it is best to keep it in small vials, since the bulk would, by gradual evaporation, become too thick, and the lost water could only be replaced by guess.

Ink stains produced by it upon the hands, etc., may be readily removed by washing with alcohol strongly acidulated with acetic acid.

No. 2,473.—**Bromide of Caffeine** (Philadelphia).

When alkaloids combine with acids to form salts, the hydrogen of the acid is not displaced, as is the case with oxides or other compounds. For instance, while potassa (KOH) and hydrobromic acid (HBr) form potassium bromide (KBr) and water (H_2O), caffeine and hydrobromic acid unite without loss of a single molecule of each constituent :

$C_8H_{10}N_4O_2$	+	HBr	=	$C_8H_{10}N_4O_2.HBr$
caffeine		hydrobromic acid		caffeine hydrobromate

In order to express by words the fact that the hydrogen of the acid has *not* been replaced, it is customary to leave the prefix "hydro" attached to the name of the acid. It is true that such a salt was formerly, and is even sometimes yet, called a "bromide." But strict application of the rules of chemical nomenclature restricts the term "bromide" to a combination of *bromine* (Br ; not hydrobromic acid, HBr) with an element, or a radical acting like an element. Thus NaBr is "sodium bromide"; $C_6H_3Br_3$ is "phenol tribromide." The confusion of the terms "hydrobromate" and "bromide" arose, no doubt, from the ambiguous nomenclature of the ammonium salt in former times, when the old chemical notation was still in vogue. NH_3 is ammonia ; when this combines with hydrobromic acid (HBr), the resulting salt was considered a combination of the two molecules, unchanged, thus : $NH_3.HBr$. It was therefore natural to call the salt "hydrobromate of ammonia." On the other hand, those who regarded NH_4 as the radical in ammonium salts explained the formation of the salt thus :

$NH_4.HO$	+	HBr	=	NH_4Br	+	H_2O
ammonium hydrate		hydrobromic acid		ammonium bromide		water

The same salt was therefore called, often indiscriminately, by two names, either "hydrobromate of ammonia" or "bromide of ammonium," and the same duplicity of appellation obtained also in the case of the iodide, chloride, sulphide, etc. From this the ambiguous nomenclature was transferred to the alkaloidal salts. In consequence we meet with such terms as "bromide of morphine." It has more recently been shown that, in such

combinations, the term "hydrobromide," "hydrochloride," etc., is the most suitable one.

The price lists of several manufacturing chemists and wholesale dealers have for a long time quoted such alkaloidal salts promiscuously as "bromide of morphine," "muriate (= hydrochlorate) of quinine," "bromide of caffeine," etc.

True hydrobromide or hydrobromate of caffeine can be obtained in definite crystals(see E. Schmidt in *Lieb. Ann.*, 217, 283; and *Berichte*, 14, 814). It has the composition $C_8H_{10}N_4O_2.HBr.2H_2O$. Like most other caffeine salts, it splits up into its components when it is dissolved in water.

No. 2,474.—**Lacmoid and Lacmoid Paper** (Philadelphia).

This artificial coloring matter has been on trial for several years as a substitute for litmus, and has in many instances been found to possess advantages over the latter.

The commercial lacmoid, however, is of very variable composition, sometimes hardly yielding any blue water-soluble color at all. Dr. Otto Foerster has recently made lacmoid a subject of special study, and finds that the commercial substance always contains a violet or blackish coloring matter which cannot be separated from the blue by precipitation. A good criterion of its quality is its rate of solubility in boiling water. If it yields only a little blue color to the latter, it should be rejected. If it shows that it contains a sufficient quantity of the blue coloring matter, it is best purified in the following manner.

It is first treated with cold alcohol until this no longer removes anything. Next it is extracted with water, the aqueous solution filtered and evaporated. The residue is again dissolved in water, filtered, and the filtrate precipitated with absolute alcohol containing a little glacial acetic acid. The precipitate is collected upon a filter and washed with alcohol, which removes a red coloring matter soluble in alkalies with violet color. The whole process of solution, precipitation, and washing is once more repeated to remove as much of the red color as possible. The final residue is now dried upon the filter, being meanwhile repeatedly moistened with alcohol to expel the acetic acid. Finally the residue is dissolved in alcohol, the solution filtered, precipitated with alcohol containing very little ammonia, collected on a filter, washed with alcohol, and dried.

Such purified lacmoid is soluble in alcohol with a pure blue color, and in pure water (free from CO_2) with ruby-red to violet color. These tints are exceedingly clear, and the least transition from alkalinity to acidity, or vice versa, is sharply detected.

Lacmoid paper (as a substitute for litmus paper) is prepared by impregnating filtering paper with an alcoholic solution of pure lacmoid, to which enough sulphuric acid has been added to render the impregnated paper red instead of blue. But an excess of acid must be avoided; it should be only in such quantity that the paper, *on drying*, acquires a blue tint again. The concentration of the solution should be such that the impregnated and dried paper will have a color resembling in quality and depth that of a forget-me-not. In order to prepare red lacmoid paper, it is best to first treat the paper with very dilute sulphuric acid and then to dry it; but it is quite difficult to make the impregnated paper retain its red color. Still, by sufficiently acidulating the solution it may be accomplished. The dried, impregnated paper should have a rose-red tint.

Comparative experiments by Dr. Foerster have shown that there is but little difference in the delicacy of the reaction between blue litmus and blue lacmoid paper, but that red lacmoid paper far exceeds red litmus paper in delicacy.

Lacmoid is sold in the market at about $2.00 per ounce.

No. 2,475.—**Constituents of the Onion** (M. C. W.).

The onion has been chemically examined by Fourcroy and Vauquelin, who first obtained the ethereal, sulphurated oil, and also ascertained the presence of a peculiar sticky substance coagulable by heat, besides sugar, free phosphoric acid, etc. Afterwards it was examined by R. Schwarz, who found also a small quantity of citric acid. The only recent quantitative analyses we can at present refer to are those by W. Dahlen and R. Pott (quoted in the work "Chemie der menschlichen Nahrungs- and Genussmittel," von König; Berlin, 1889, i., 710). The mean of the results obtained by these chemists is as follows:

Red Onion, fresh, containing 85.99 per cent of water. Nitrogenized constituents, 1.68 per cent. Fat, 0.10. Sugar, 2.78. Extractive free from nitrogen, 8.04. Cellulose or lignose, 0.71. Ash (mineral constituents), 0.70. [There is also present about 0.25 per cent of an acrid essential oil, containing sulphur.] In 100 parts of the dry substance there are 12.25 parts of nitrogenized constituents, representing altogether 1.96 parts of nitrogen.

No. 2,476.—**Schuster's Alkalimeter** (M. C. W.).

One of our subscribers asks us to give him an account or a description of Schuster's alkalimeter. This is not known to us. Perhaps some of our readers can supply the information.

No. 2,477.—**"Red Gum"** (R. M. Co.).

This name is applied to several species of *Eucalyptus*, more particularly to *E. rostrata* Schlecht., which tree is also known under the name of "Flooded Gum." But "red gum" is also, and more properly, used to denote a red sap, liquid or coagulated, which is obtained in large quantities from *Eucalyptus resinifera* Smith, and also other species of Eucalyptus. It is known also under the names Eucalyptus Kino, Australian Kino, Botany-bay Kino. Large quantities of this are exported to London, where it may, no doubt, be obtained. We are not aware that it is regularly used in this country. It is, no doubt, an efficient astringent, since it resembles genuine kino chemically.

No. 2,478.—**Indelible Ink** (C. E. R.).

A good indelible ink, suitable for your purposes, may be made as follows:

Nitrate of Silver	1 oz.
Acacia	½ "
Water	1 fl. oz.
Water of Ammonia	2 fl. oz.
Carmine	30 grains.

Dissolve the acacia in the water of ammonia, and the silver salt in the water. Mix the two solutions. Triturate the carmine with a small quantity of the solution, and gradually add the remainder until the carmine is dissolved.

The object of adding carmine is merely to color it so that the writing made with the ink may be seen. India ink may be used in place of carmine.

When fabrics have been marked with this ink, the places written upon should be gone over with a hot sad-iron.

It may also be applied by means of a stencil or rubber stamp. In this case the ink should be thickened by adding about one ounce of acacia.

No. 2,479.—**Elixir of Pepsin and Bismuth** (M. M. M.).

This subscriber wants a formula for a permanently clear elixir of pepsin and bismuth, containing in each fluidrachm 5 grains of the former and 1 grain of citrate of bismuth and ammonium.

Mr. M. does not specify whether 5 grains of undiluted or of saccharated pepsin are intended. But as we should consider 5 grains of undiluted, or so-called "pure" pepsin too much of a dose, we assume that the saccharated is meant. The latter, however, varies so much in strength that "5 grains" is an exceedingly indefinite term. Even a stated quantity of the "pure" is a rather indefinite amount. We may consider that 5 grains of the best commercial saccharated pepsin is about equivalent to 1 grain of the ordinary kind of undiluted pepsin. Of course, if we compare it with the best, then 1 part of "pure" pepsin would be equivalent perhaps to 20 or 30 parts of the saccharated.

These remarks being premised, we would recommend to our correspondent to follow the formula for elixir of pepsin and bismuth given in the National Formulary, No. 83 (page 28), using 1 grain of "pure" or undiluted pepsin per fluidrachm, and reducing the citrate of bismuth and ammonium to one-half. The formula would then be:

Pepsin (undiluted)	128 grains.
Citrate of Bismuth and Ammonium	128 "
Water of Ammonia	q. s.
Glycerin	2 fl. oz.
Alcohol	3 "
Syrup	4 "
Compound Elixir of Taraxacum	1 "
Purified Talcum	120 grains.
Water	enough to make 16 fl. oz.

Dissolve the pepsin in 4 fl. oz. of water. Dissolve the bismuth salt in 1 fl. oz. of warm water, allow the solution to stand until clear, if necessary; then decant the clear liquid, and add to the residue just enough water of ammonia to dissolve it, carefully avoiding an excess. Mix the two solutions, and add the glycerin, elixir, and alcohol. Thoroughly incorporate the talcum [or use in place of it precipitated phosphate of calcium] with the mixture, filter through a wetted filter, and pass enough water through the filter to obtain 13 fl. oz. To this add the syrup.

Ferrocyanides of the Alkaloids.—Only within the last few years has any attention been given to these compounds, and now Professor Beckurts describes the characters of a number of such salts which are all acid ferrocyanides. That of atropine is an amorphous powder insoluble in alcohol; of quinine, a greenish powder insoluble in alcohol, ether, or chloroform; of cocaine, a white, amorphous powder difficultly soluble in water, insoluble in alcohol and ether; of morphine, a white, crystalline powder, assuming a bluish tint on exposure to the air, readily soluble in water. So far these compounds have not found any practical application but possess a certain theoretical interest.